# INVENTING AN INTERNET

*Introducing a Supercomputer*

Philip Emeagwali

**emeagwali.com**

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*To my wife, Dale, for being so supportive and a wonderful partner in life.*

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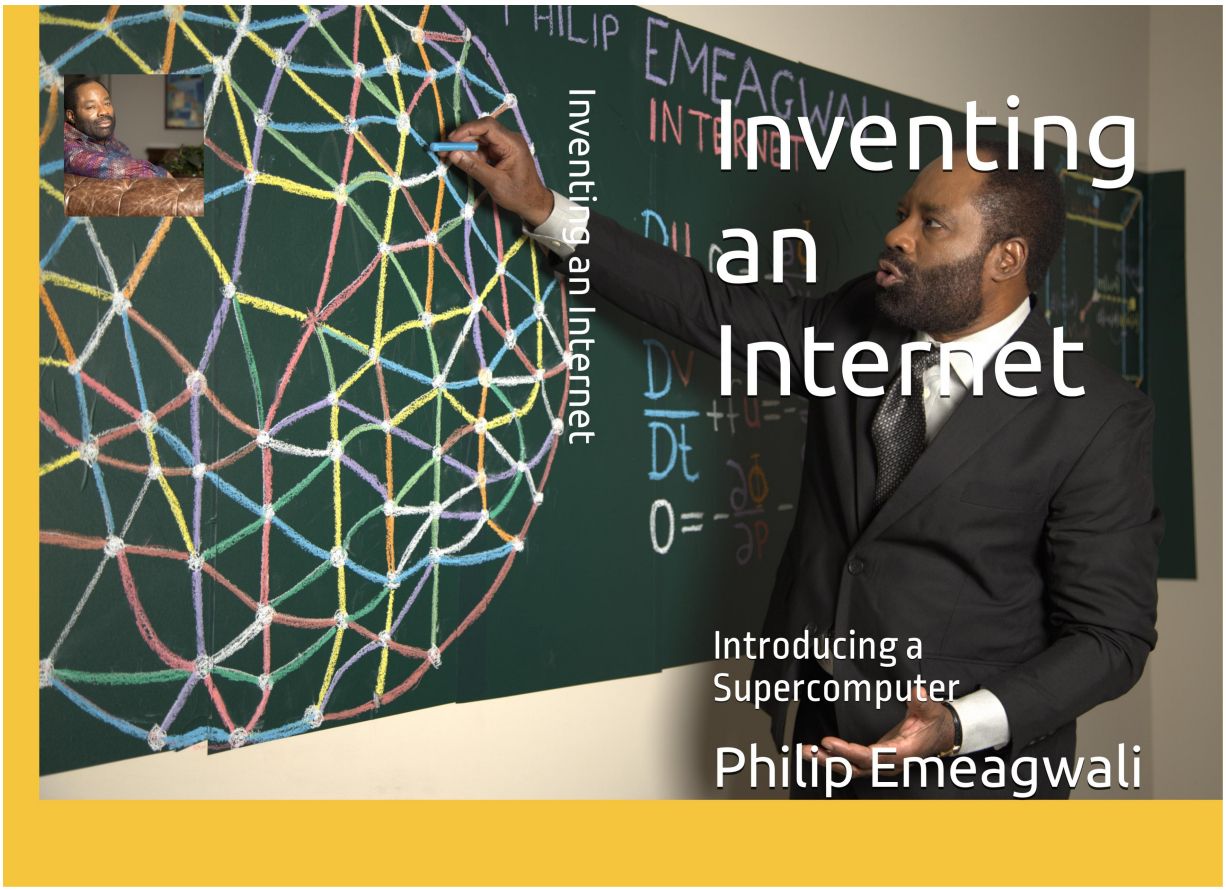
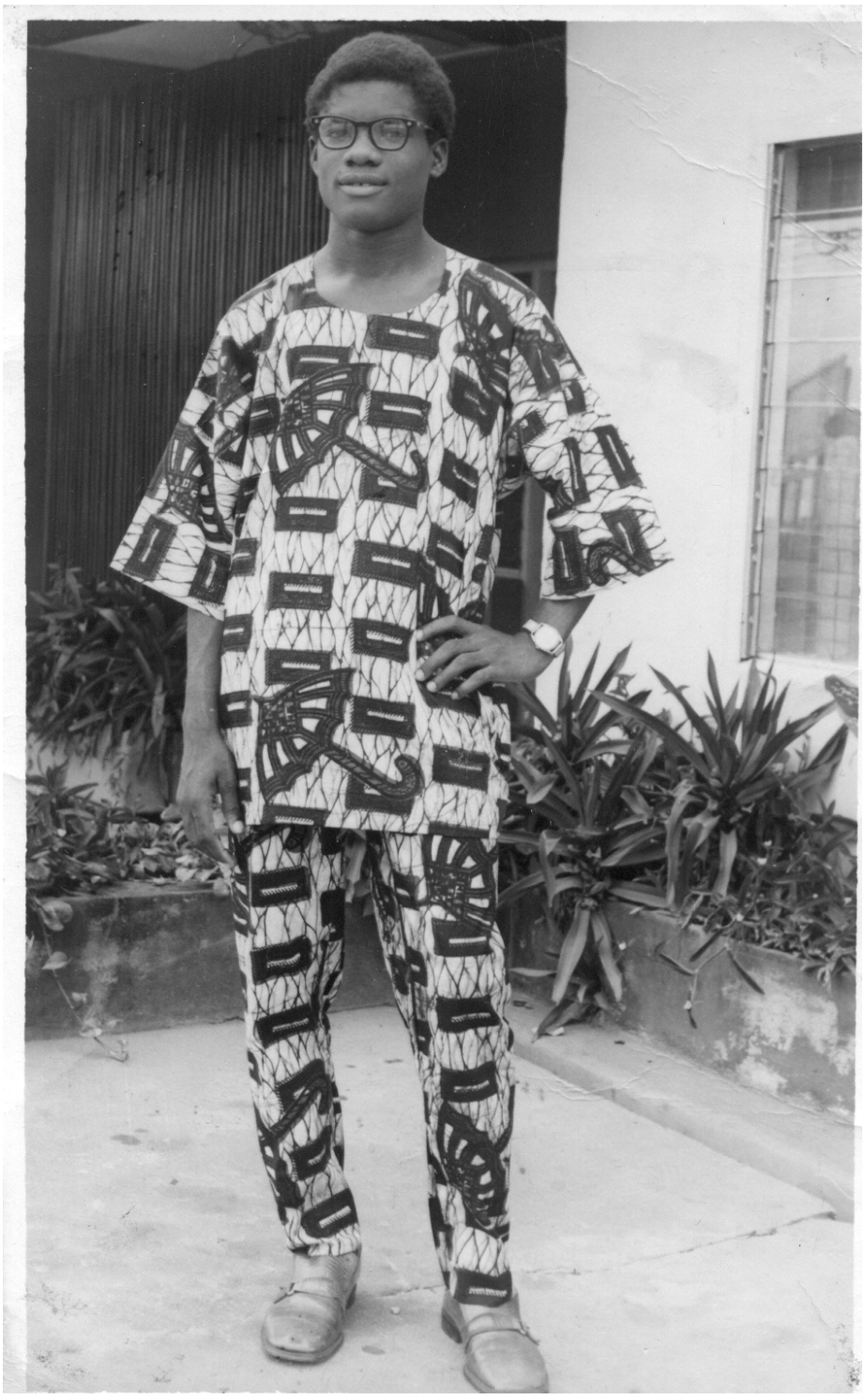



# 1ST LECTURE: MY JOURNEY FROM THE WAR FRONT TO THE FRONTIER OF COMPUTING

Lecture 210829-1of4

**Broadcast 29 August 2021**

**https://youtu.be/gZxCy0nGaps**



# A LETTER FROM THE BLOODIEST BATTLEFIELD

## One Day We Had to Run to Biafra!

### The Day of the Long Night

In April 1967, I was twelve years old, and my country of birth, Nigeria, was torn apart by the earlier bloody military coup of January 15, 1966. During that coup, our Prime Minister, Abubakar Tafawa Balewa, was killed. Six months later, Nigeria was again torn apart by a bloody counter coup during which its new military President, Major-General Johnson Aguiyi-Ironsi, was killed. By September 1966, up to thirty thousand (30,000) Igbo-speaking persons, from the south-eastern region of Nigeria, who were living in Nigeria but living outside Igbo land were killed.

The killings of Igbos were fuelled by the anger over the earlier killings of prominent Northern Nigerian leaders, including the first premier (or governor) of Northern Nigeria, Sir Ahmadu Bello. Hundreds of Northern Nigerians—mainly Hausa- and Fulani-speaking persons—that were living in Igbo land, or in the

south-eastern region of Nigeria, were also killed. They were killed in retaliation for the killings of up to 30,000 Igbos who were living in Northern Nigeria.

## One Day We Had to Run!

In the aftermath of those killings of up to 30,000 Igbos, one million Igbo-speaking people fled to their ancestral Igbo land.
I was one of those one million Igbos
that became refugees
in their own country, **Biafra**.
In late April 1967, I fled as a refugee,
from my school dormitory.
It was late morning
and outside my dormitory,
called Erameh House,
at Saint George's College, Obinomba, **Nigeria**.
I was a little surprised
to see my mother, **Mama,**
in front of Erameh House.
She traveled to Obinomba
from our residence at the Nurses' Quarters
of General Hospital, Agbor.
My seven-month-old brother, **Peter**,

was strapped to her back
with a swath of colorful Nigerian "*lappa*" cloth.

In April 1967, the Nigerian ethnic killings
and civil uprisings has worsened.
And about a dozen Igbo-speaking students
from the heart of Igbo land
who were studying at Saint George's College
were withdrawn by their parents.
So without being told, I figured out
that the reason
**Mama** came to **Obinomba**
was to withdraw me from
Saint George's College.
And that my family
will be fleeing from Agbor
to our ancestral hometown of Onitsha
that was east of the River Niger.

A few minutes after Mama's arrival,
we were in the Principal's Office
waiting to pick up my school transcript
as well as a testimonial letter
that was written by my principal,

**Father Thomas Kennedy**.

I had a special relationship with **Kennedy**

whom I travelled with

on every other Sunday morning

and as an altar boy

in the Catholic church in **Obiaruku**,

and in the intimate chapels in Obinomba, **Abavo**, and Umutu.

An hour after I had received

my school transfer documents,

Mama, Peter, and I boarded a taxi.

The taxi was a five-passenger

Peugeot 403 sedan

that squeezed in eight adults

plus my eight-month-old brother Peter.

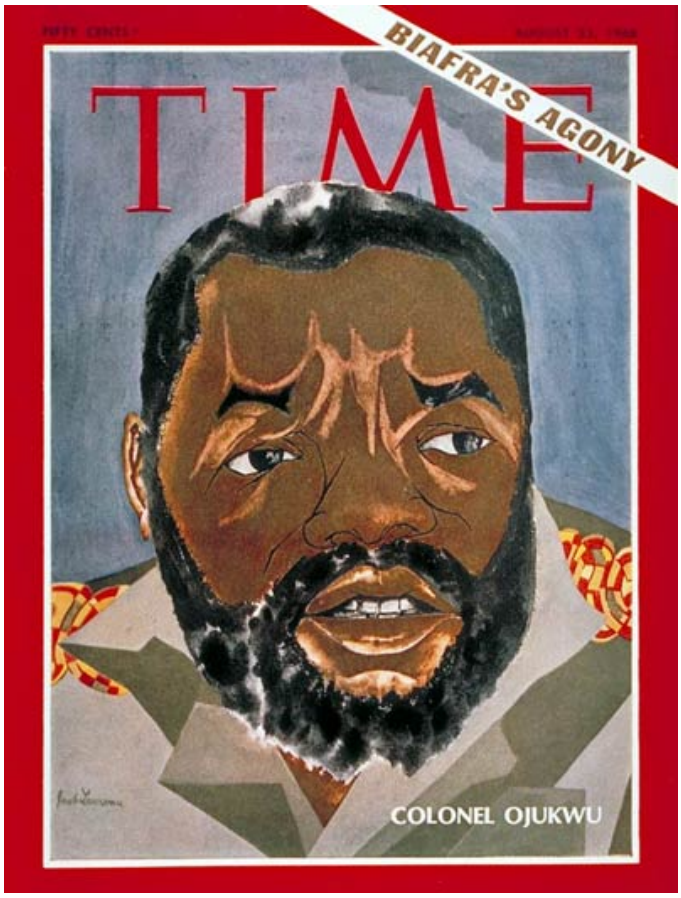
After traveling for thirty-three miles,

we arrived at Agbor motor park

that was inside the main market

of **Agbor**.

# FOR MOST OF IT I HAVE NO WORDS!




Up to thirty thousand Igbos were killed
in reprisal attacks
that took place across

the Northern Region Nigeria.
The new military government
of the south-eastern region of Nigeria
was led by Colonel Odumegwu Ojukwu.
He exploited the bad situation
by fanning fears of ethnic cleansing.
In major Igbo cities,
including Onitsha and Enugu,
posters and cartoons
warned Igbo-speaking people
that Hausa- and Fulani-speaking people
will kill them, unless they secede
from Nigeria and formed a new nation,
called Biafra.

The irony lost on us, Igbos,
was that forty percent of Biafrans
weren't Igbo-speaking people.
Those forty percent non-Igbos
were the Efiks, Ibibios, and Ijaws.
As regional minorities, they resented
how the Igbos dominated them
during the era of the south-eastern region
of Nigeria.

The non-Igbos in the new Biafra

feared that Igbos will oppress them

and preferred to remain in **Nigeria**.

## Nigerian Soldiers Almost Killed My Father!


Nnaemeka James Emeagwali with book in his hand and second from right of front row. Nursing Staff at General Hospital, Agbor, Nigeria.

Obam Balonwu (nee Okudo) is the maternal grandmother of Chukwurah Philip Emeagwali. Photo circa 1955 at 6C Wilkinson Road, Onitsha, Eastern Region, Nigeria.

In early **1967**,
Igbo-speaking people within
**Nigeria**
who were living outside
the south-eastern region of **Nigeria**
were fleeing back
to their ancestral Igbo homelands.

In late April **1967**,
my parents and seven children
lived in a modest two-bedroom apartment.
That apartment
was one of the four nurses' residences
that were known as the Nurses' Quarters

of the **General Hospital**, Agbor,
Midwest Region, **Nigeria**.

Within those four nurses' residences,
our apartment was the one closest
to the main road that led from
**Benin City** to **Agbor** to **Onitsha**.
The huge compound next to our front yard
was the Prison Yards of Agbor.

As a staff nurse at that General Hospital,
my father was on call, 24 hours a day
and seven days a week.
My maternal grandmother
died in **Onitsha**
and on Christmas Eve of
December 24, **1966**.
As a staff nurse on a 24-hour call,
my father couldn't travel to **Onitsha**—that was only fifty miles away—
and do so to attend
the funeral of his **mother-in-law**.

As a nurse, my father—assisted the surgeon—
and worked long shifts
whenever a terrible road accident occurs, near Agbor.

That General Hospital was the only one
for the twenty-mile radius around **Agbor.**
That General Hospital
was the emergency room
for automobile accidents
that occurred along the roads
leading from **Benin City**
through **Agbor** to **Asaba**.

# INVENTING THE WORLD'S FASTEST COMPUTING **OVERCOMING**

## THE LAW OF DIMINISHING RETURN IN

## SUPERCOMPUTER SPEED

A frequently asked question was this:

Who is the **father**
of the supercomputer,
as it's known today?

My contributions to the invention
of the first world's fastest computer, as it's known today and as it's expected to be known tomorrow, **were these**: I discovered that **Amdahl's Law** as described in computer science textbooks and by supercomputer scientists wasn't a law of physics.

**Amdahl's Law** was a law established by
**Gene Amdahl**.

The common interpretation
of Amdahl's Law **was this**:

When one million processors
are used to tackle
one Grand Challenge Problem—including the most difficult problems that arise
in science, medicine, and mathematics—
the supercomputer scientist
could at most
achieve an eight-fold increase in speed, rather than the million-fold increase
that was hoped for.
With that belief that quote, unquote

"Amdahl's Law will get you,"

the supercomputer manufacturers,
of the 1970s and 80s,
only used up to four custom-manufactured, million-dollar, super-fast processors,
rather than one million
inexpensive, slow processors,
as done today. The rationale of the leading supercomputer manufacturers **was that**

supercomputing **across**
the slowest processors
will forever remain
in the realm of science fiction.

I'm the first person
to know the fastest computer,
as it's known today.

Philip Emeagwali Fastest Computer My contributions
to the development
of the world's fastest computer
**were these**:

I discovered
how to circumvent **Amdahl's Law.**
And how to do so by dividing
one Grand Challenge Problem
of mathematics
that's defined around a globe
and dividing it into 65,536
lesser challenging problems.
And then solving them across
a new Internet
that's a new global network of

the 65,536 slowest processors in the world.
Those processors are used to solve
those 65,536 problems.
They possess a one-to-one
processor-to-problem correspondence
between my new Internet
and the 65,536 smaller problems.

I discovered that the Amdahl's Law limit
wasn't a physical limit.
Amdahl's Law was a limit maintained
by our insufficient knowledge
of how to assemble one billion processors.
And make them parallel to
one billion problems
that, in turn, were created by dividing
one compute-intensive problem
into one billion
lesser challenging problems.

## Quantifying My Contributions to the Computer

In my scientific discovery that occurred
on the Fourth of July 1989,

my world's fastest computing
pushed Amdahl's limit
by a factor of 65,536-fold down the road.
Looking farther in time,
quantum computing
could be the next fundamental change.

However, I believe that
the quantum computer
would always have limited use.

In the early 1980s, I embarked
on my journey
to the frontier of knowledge
of the world's most powerful computers.
I did so at a time
every supercomputer scientist
believed it will be impossible
to harness one billion processors.
And use them as one coherent computer
to solve
the most difficult problems in mathematics,
such as simulating global warming.
And solve them one billion times **faster** than one processor
solving the same problem alone.

I had to follow
never-before-threaded pathways
that took me to a new Internet.
The emails I sent
travelled—from the sending processor
to the receiving processor.
I had to know those pathways
before I could achieve my
one-processor to one-problem correspondence.

My one-to-one mapping
was a necessary condition
to my bypassing the perceived limit
in speed of the world's fastest computer.

Textbooks described that fictitious
speed limit
as a limit imposed by **Amdahl's Law**.
My discovery
of the first world's fastest computing
**across** the supercomputer,
as it's known today,
was my experimental confirmation
that my new global network of
sixty-four binary thousand processors
could be harnessed.

And used to solve
the most difficult problems in mathematics.
And solve them
sixty-four binary thousand times **faster** than Amdahl's Law limit
decreed.
The most powerful supercomputers
are each powered by up to
**10.65** million
commodity, self-contained processors
which were identical and shared nothing.
And that costs up to one billion
two hundred and fifty million dollars each.
And it costs 40 percent more than the mile-long Second Niger
Bridge at Onitsha, my ancestral hometown
in **Nigeria**.

# FROM SLOWEST TO FASTEST COMPUTING

The world's fastest computer occupies the footprint of a soccer field and costs forty percent more than the mile-long Second Niger Bridge of Nigeria.

In the 1980s, they were 25,000
supercomputer scientists in the world.
In the 1970s and 80s, the **upper echelon**
of those supercomputing **across**
a billion processors
was **sparsely populated**.
In the 1980s, I could use my fingers

to count the programmers
of the few massively
parallel computers that existed,
back then, but that couldn't
then be harnessed
to solve the most difficult problems
in mathematics.
Until I discovered that quote, unquote
"final proof" on July 4, **1989**,
it was impossible
to use the slowest processors
in the world
to emulate the world's fastest computer
that was faster than any supercomputer.

In the 1980s, I stood out among the 25,000
supercomputer scientists in the world.
In that decade, I, alone, controlled sixteen
state-of-the-art supercomputers.
Today, the most powerful supercomputer
in the world costs one billion,
two hundred and fifty million dollars each,
or the budget of a small nation.
The reason those sixteen

fastest computer-hopefuls
were idle and available to me **alone**
was that no programmer
in the world, except myself,
knew how to harness
it's up to sixty-four
binary thousand processors
which shared nothing. Nobody else knew
how to harness a billion processors.
And how to use them to solve
and reduce the **time-to-solution**
of the most difficult problems
in mathematics, physics,
and computer science.

The poster boy
of the twenty most difficult problems
in mathematics
is the global climate model
that must be used
to foresee otherwise unforeseeable
global warming.

Why I Was in Newspapers Each fastest computer-

hopeful

of the 1980s

that was then abandoned and dismissed as a colossal waste of

everybody's time

was waiting for me,

**Philip Emeagwali,**

to harness it as a new supercomputer.

Today, ten thousand programmers

can work together to use

one computing machinery

that's powered by ten million processors.

And each programmer will be assigned

one thousand processors

that's one coherent and fast computer.

But in the 1980s,

I was the only full-time programmer

of the most massively

parallel supercomputers in the world.

I knew that fact because, in the 1980s,

only one programmer

can lock all the processors

of such machineries and do so **at once**.

And after I logged into each

massively parallel supercomputer,

I felt like I was home alone.

I, **Philip Emeagwali**,

locked all the processors

of my sixteen supercomputer-hopefuls

of the 1980s. That was how

I discovered how to harness

the 65,536 slowest processors

in the world.

I was in the news

because I discovered

how to use the slowest processors

to develop the fastest computers.

My discovery of the world's

fastest computing

was in the June 20, 1990,

issue of *The Wall Street Journal*.

# MY OBSTACLES TO INVENTING THE FASTEST COMPUTING A STUDENT WRITING A SCHOOL ESSAY ASKED ME:

"Who is the **father**
**of the fastest computers**?"

Any supercomputer scientist
that's famous
for his or her contributions
to the development
of the world's fastest computer,
that's powered by millions of processors,
was in his or her own way
a **father** or a **mother**
of the fastest computer.

**Seymour Cray** was one of the fathers
of the vector computer.
However, the vector computer
became obsolete on July 4, **1989**,
the date I discovered
that the technology can't power
the world's most powerful supercomputers.
Therefore, **Seymour Cray**
is definitely not a father
of the massively parallel supercomputer
that's the world's fastest computer.
In his most famous quote,
**Seymour Cray**, ridiculed and dismissed the harnessing of
millions of processors.
He described the new technology
as science-fiction supercomputing.
Computer science textbook authors
also wrote that thousands of processors
could not be utilized
to simultaneously solve
the hardest problems
in science, engineering,
and medicine. In the 1980s,

**Seymour Cray**

taunted the parallel computing community:

"If you were plowing a field,
which would you rather use?
Two strong oxen or 1024 chickens?"

## Pioneers of Fastest Computing

In the 1980s, only one person
could be at the **farthest frontier**
of the most massively parallel supercomputing.
In the late 1980s, that **farthest frontier**
was outlined by a new spherical island
of **sixty-four binary thousand**
off-the-shelf processors.
I—**Philip Emeagwali**—invented
a new Internet.
And I contributed new knowledge
at the farthest frontier of computer science,
where the fastest computation occurs.

My **new Internet**
was powered by my new global network
of sixty-four binary thousand

off-the-shelf processors.
That’s equivalent to a new supercomputer
that’s powered by a new spherical island
of as many identical computers
that were in constant dialogue
with each other.
**I’m** the first eyewitness
from that farthest frontier
of the fastest computing
that can be executed **across**
up to a billion processors. In the 1980s,
I was the lone, large-scale
computational scientist at that jagged, multidisciplinary frontier
of human knowledge
that was a crossroad
where new calculus, largest-scaled algebra, highest-resolution
computational physics,
and fastest computing intersect.
**I** conducted my research alone.
And I did so at that
**undiscovered territory**
where the fastest computing
can be discovered.
In the **1980**s, everybody else believed

that the fastest computing **across**
the slowest processors
will forever remain
in the realm of science fiction.
And will be an enormous waste
of everybody's time.

## Visualizing Supercomputing in Space-Time

The speech of then U.S. President
Bill Clinton of August 26, 2000,
was an important moment of validation
of my contribution of fastest computing
to the development of the supercomputer.

My world's fastest computing **across**
the world's slowest processors
was motivated by my need
to solve the most difficult problems
in mathematics.
Such problems are described as
initial-boundary value problems.
Most often, a boundary value problem
is governed by a system of complicated
partial **differential** equations,

such as the mathematical representation
of a global climate model
which began in the realm of science fiction
when it was first published
on February 1, 1922.

Science deals with facts
while fiction deals with truths.

On June 20, 1974, in Corvallis, Oregon, USA, I
commenced my search
for the truth within that science fiction story that was published
on February 1, 1922.
I began my science fiction quest
by visualizing my theorized
world's fastest computing
and doing so in a four-dimensional
space-time continuum.
When computing with only one processor,
I visualized time division,
without space division.
But in my world's fastest computing
of July 4, 1989, in Los Alamos,
New Mexico, USA,
and which occurred **across**

my ensemble of 65,536 processors,
I visualized both time and space divisions.
From my back-of-the-envelope estimation,
serial and automatic computing
yields one order-of-magnitude increase over mechanical, or
analog, computing.
I reasoned that
my first world's fastest computing across
four-dimensional space-time
will yield four orders of magnitude **increase** in the speed of
solving the most difficult problems
in mathematics.
The world's fastest computer
is a necessary, but not sufficient, machinery for solving
the most difficult problems
in mathematics.
Such tough problems arise as
large-scale geophysical fluid dynamics.
Fluid dynamics-informed simulations
are central to understanding
the spread of contagious viruses
in the Nigerian buses
that pack passengers like sardines.

# How I Leapfrogged from Slowest Computer to Fastest Supercomputer

To invent
is to make the previously unseen **seen**.
My invention was that I made the 65,536
slowest processors in the world
which was previously unseen
as a supercomputer
to be **seen** as the world's fastest computer.
My new supercomputer
became a new Internet, in reality.
My invention was that I visualized
my theorized world's fastest computer
as a reality.
In the 1970s, that machinery
was the world's slowest computer.
And the technology only existed
in the realm of science fiction.
I visualized its inner workings **correctly**. And did so before
the new technology could manifest itself
as the 65,536 slowest processors

in the world that I used—on July 4, 1989—

to record the fastest speed in computing.

# HOW I VISUALIZED PHILIP EMEAGWALI INTERNET I'M THE ONLY FATHER OF THE INTERNET THAT INVENTED A NEW INTERNET THAT'S A NEW SUPERCOMPUTER.

I visualized my new supercomputer
not as a new computer, *by or in itself,*
but as a new Internet, in reality.
I visualized my new Internet
as a new global network of
two-**raised**-to-power sixteen processors.
I harnessed those processors
as one coherent supercomputer
and did so by maintaining a one-processor to one-vertex

**mapping**

and **correspondence**

with the as many vertices of the cube

in a sixteen-dimensional hyperspace.

To achieve the fastest speed,

I uniformly distributed my processors **across** the surface of a

sphere

that I also visualized

as tightly circumscribed by a cube.

I visualized that world's fastest computer

and did so fifteen years in advance

and did so before

my invention took place.

That new supercomputer

that manifested itself for the first time,

back At 8:15 in the morning, on

July 4, 1989,

in Los Alamos, New Mexico,

USA, was the world's fastest computer

that I used to solve

the most difficult problem in mathematics

which I solved **across**

the 65,536 slowest processors

in the world.

# How I Leapfrogged from Fiction to Nonfiction That

new supercomputer

began as a tiny acorn,

or as the singular slowest processor

in the world.

That processor multiplied

to become my ensemble of

two-**raised**-to-power sixteen processors.

My ensemble became

a mighty oak tree

in the world of mathematics.

And became the world's most powerful

and fastest computer.

The fastest computer in the world

occupies the space of a soccer field.

My visualizations which I achieved through my geometrical

metaphors

—of a cube that was tightly embedded

within a sphere—was what inspired me

to believe that computing **across**

millions of processors,

which was science fiction

in the 1970s and 80s,

could become the science nonfiction

of 1989.

## Solving the Most Difficult Problems in Mathematics

To discover the world's fastest computing

and to invent the technology in **1989**

was to make the unimaginable-to-compute

possible-to-super-compute.

In **1989**, I invented

**how to** use a billion processors

to execute

the world's fastest computing

and solve otherwise intractable

problems arising beyond the frontier of calculus.

Such physics problems define the crux

of the twenty most difficult problems

of supercomputing.

They include detailed weather forecasting, climate modeling,

simulations

of production oil fields,

and large-scale computational

fluid dynamics.

I achieved the greatest speed and accuracy

by discovering that

up to a billion processors could compute,

in tandem, to solve as many problems.

In **1989**, I was in the news because

I invented how to solve

difficult mathematical problems

in extreme-scale computational physics.

I invented how to solve

the world's most compute-intensive problems.

And solve them **across**

up to a billion coupled processors.

I Was the First Person to Record the Fastest

Computer Speed Alone I was the first person to demonstrate

**how to** harness up to a billion processors,

**how to** communicate synchronously,

**how to** compute simultaneously,

and **how to** do both **across**

a new Internet.

First, I invented that new Internet

as my new global network of

65,536 off-the-shelf processors

and standard parts.

Second, I also invented that new Internet

as my new global network of

65,536 identical processors.

In **1989**, it made the news headlines

that an African supercomputer genius

in the USA

had discovered **how to** make

the unimaginable-to-compute

possible-to-super-compute.

I discovered it's possible to solve

the most difficult problems in mathematics

in computational physics.

And solve them **across**

an ensemble of up to one billion processors

that I invented as a new Internet

that's a new

global network of processors.

After studying calculus full time
and for the twenty years that followed
June 1970,
I understood the abstract mathematics
that was behind
the partial **differential** equations
at the farthest frontier
of calculus.
And my mathematical maturity
that grew over two decades
enabled me to program
all my 65,536 processors.
And do so without physically touching
any of those processors.
In 1989, I was in the news because
my world's fastest computing
delivered immediate results.
It was a knockout!

**Inventing the World's Fastest Computer So, I had to know exactly**
**where each of my two-raised-to-power sixteen, or sixty-four binary thousand, processors was at.**
**And know their unique**
**email addresses.**

**I used those 65,536 email addresses**

**of the as many processors**

**of that new Internet**

**and used them as their binary reflected**

**identification numbers.**

**My light-bulb Eureka moment occurred**

**when I visualized that new Internet**

**in the shape of the hypercube**

**within the hypersphere**

**in the hyperspace of sixteen dimensions.**

TAMING EMEAGWALI EQUATIONS: UNVEILING THE MYSTERIES OF CRUDE OIL RECOVERY THE WORLD'S FASTEST COMPUTING ACROSS MILLIONS OF COUPLED, OFF-THE-SHELF PROCESSORS THAT SHARED NOTHING THAT EACH OPERATED ITS OPERATING SYSTEM IS ADVANTAGEOUS IN TRIPLE-M MODELLING.

THAT'S THE ACRONYM FOR

# MULTISCALE, MULTIPHYSICS, AND MULTILEVEL SIMULATIONS. IN COMPUTATIONAL PHYSICS, TRIPLE-M MODELS ARE MATHEMATICAL REPRESENTATIONS OF PHENOMENA AT DISPARATE SCALES.

The system of **nine**

**Philip Emeagwali equations**

is part of the mathematical representations

of the motions

of oil, injected water,

and natural gas

that flow up to 7.7 miles

(or 12.4 kilometers) deep

and **across** an oil producing field
that's often the size of Abuja,
**Nigeria**.

## What is Philip Emeagwali Most Famous For?

A school essay question **is this**:

"What is **Philip Emeagwali**
most famous for?"

In 1989, I was in the news because
I proved something
that wasn't proven then
in any mathematics, physics,
or computer science textbook.
I proved that the slowest processors
in the world
could be used to solve
the most difficult problems in mathematics.
Furthermore, I discovered how to solve
the most difficult problems in computing.
And solve them
at the fastest speeds in the world.
I was the first person to prove that
the world fastest computers

can be powered
the world’s slowest processors.
That discovery, that occurred
on July 4, 1989, made it possible
for the fastest computers of today
to leave science-fiction books
and enter science textbooks.
I was in the news because
I discovered how to solve
the most difficult problems
in mathematics, physics,
and computer science.

MY LEAPFROG TO FASTEST COMPUTING THE GRAND CHALLENGE PROBLEM THAT I DISCOVERED HOW TO SOLVE IS TO THE WORLD'S FASTEST COMPUTER

WHAT HAMLET IS TO THE PLAY "THE PRINCE OF DENMARK."

SUPERCOMPUTING WITHOUT SOLVING THE MOST DIFFICULT PROBLEM IN MATHEMATICS

IS LIKE STAGING THE PLAY

HAMLET

WITHOUT THE PRINCE OF

DENMARK.

MY SUPERCOMPUTER

BREAKTHROUGH

THAT OCCURRED ON THE

FOURTH OF JULY 1989

IN LOS ALAMOS, NEW MEXICO,

USA,

WAS HOW TO COMPUTE THE

FASTEST AND DO SO

WITH THE SLOWEST

PROCESSORS

IN THE WORLD.

MY SCIENTIFIC DISCOVERY

WAS THAT THE FASTEST

COMPUTER,

OR SUPERCOMPUTER, IN THE

WORLD

CAN EMERGE FROM THE

BOWELS

OF AN ENSEMBLE

OF THE SLOWEST PROCESSORS

IN THE WORLD.

Philip Emeagwali Computer A school essay question **is this**:

“What did Philip Emeagwali invent?”

I invented how to develop
the world's fastest computers
from the world's slowest processors.

My invention
laid the foundation for the **precursor**
to the fastest computers of today.
My invention is **embodied**
inside the fastest computers
that are now powered by
hundreds of identical processors.
My invention is **embodied**
inside the state-of-the-art supercomputers.
The world's fastest computers
are powered by millions of processors
that shared nothing,
but were in dialogue with each other.
My invention of fastest computing
is the reason school essays are written
on the contributions of
**Philip Emeagwali** to science.
My invention
is the reason it's no longer said that
parallel supercomputing

is a beautiful theory

that lacks an experimental confirmation.

## Fastest Computing from Slowest Processing

For me,

inventing the world's fastest computer

was like assembling

65,536 pieces of puzzle.

And doing so to see

a never-before-seen island

that is one coherent supercomputer,

or rather a new Internet

that **coalesced** as the fastest computer

in the world, back at 8:15 in the morning

of July 4, 1989,

in Los Alamos, New Mexico, USA.

If the supercomputer scientist

could wave a magic wand

that will enable her to solve

the most difficult problem in mathematics—

or a problem that captures

the public's imagination—

her request would **be this**:

a demand for an unlimited number
of processors to be used to materialize
the fastest computing
that will enable her to foresee
otherwise unforeseeable
long-term global warming
as well as deeply understand
how to control the spread
of COVID-19.

# HOW ARE THE WORLD'S FASTEST COMPUTERS MADE?

People often ask:

"How is the **super**computer different from the computer?"

The world's fastest computer weighs as much as eight thousand persons. And is twenty million times more powerful than your laptop.

In 1989, I was in the news because I discovered the world's fastest computing. I discovered how a million processors can coordinate and work together to solve the same problem. I discovered how to harness

a billion processors.
And do so to solve
one complex and time-consuming problem that would be
otherwise impossible to solve.

My contribution to the development
of the world's fastest computers
**is this**:

I discovered that an ensemble
of a billion processors
that are locked together
can be programmed
to emulate one seamless,
coherent machinery
that's a new supercomputer, in reality.

I discovered that
the number of processors needed
to compute fastest is proportional
to the compute-intensiveness
of the problem.
More often than not,
the most difficult problems
in mathematics

arise as variations in the calculations
called computational fluid dynamics.
The mathematical structure
of the global climate model
differs slightly from that of the
petroleum reservoir simulation
that I presented, in 198**9.**
Both are the prototypical problems
of large-scale
computational fluid dynamics.

## Unleashing the Unstoppable Power of Supercomputers

The most powerful computers
are powered by millions
of coupled processors.
Supercomputers are instruments
of modern science that must be used
to make scientific discoveries
and technical breakthroughs.
The fastest computers are used to predict
the paths of hurricanes; predict
when an earthquake might occur;
predict global warming;

understand gene therapy;

discover new molecules

that could lead to new drugs

for combating a global pandemic;

and more accurately forecast

the spread of the corona virus

through communities

and to test the impact

of various social-distancing measures.

Supercomputing helps discover

antiviral drugs

and develop vaccines in months,

rather than in years.

**Computing Faster than Supercomputing The fastest computing across**

**a billion processors**

**is both a journey and a destination.**

**My scientific discovery**

**of the world's fastest computing**

**fuelled the quest for a new destination,**

**namely the next horizon**

**in supercomputing.**

**That new horizon is called**
**quantum computing.**
**How to model the spread of COVID-19**
**within that new horizon resides**
**in the realm of science fiction.**
**How to simulate the weather**
**within that new horizon**
**is still beyond our understanding.**

Fastest computing across
an ensemble of a billion processors
changed the logic
of sequential computing.
That logic changed from solving
one problem **at a time**
to solving many problems **at once**,
or in parallel.
The fundamental change **was this**:

The sequential thought processes
of the past
were replaced with
parallel thought processes of the present.

FASTEST COMPUTING
AROUND AN INTERNET A
THEORY IS NOT POSITIVELY
TRUE.
IN THE 1970S AND 80S,
MY RESEARCH QUEST WAS FOR
THE SOLUTION
OF THE MOST COMPUTE-
INTENSIVE PROBLEMS
IN HIGH-PERFORMANCE
SUPERCOMPUTING
AND AS LARGE-SCALE
COMPUTATIONAL FLUID

# DYNAMICS.

# IN RETROSPECT

# AND IN THE LANGUAGE OF THE WORLD'S FASTEST COMPUTER,

# THE MOST IMPORTANT QUESTION

# IN COMPUTER SCIENCE

# IS THIS:

"How can we use **10.65 million**
processors
and use them to invent
how to compress
**10.65 million** days, or 30,000 years,
of **time-to-solution**
within one processor
to merely one day
of **time-to-solution** across

a spherical island of

**10.65 million** processors?”

The news media,

including the June 20, 1990, issue

of The *Wall Street Journal*,

noted that I—**Philip Emeagwali**—discovered

how to use, as the world’s fastest computer, a new Internet that I invented.

And how to use that technology

as a new global network of

up to one billion off-the-shelf processors.

Or as a spherical island of

as many identical computers.

I **invented**

how to use that new Internet

to reduce 65,536 days, or 180 years,

of **time-to-solution**

within one processor.

I **invented**

how to reduce that 180 years

of **time-to-solution**

to merely one day

of **time-to-solution** **across**

a new global network of
65,536 processors
which outlined and defined
**my new Internet**.

## A Quantum Leapfrog to the Fastest Computer?

The reason my experimental breakthrough
made the news headlines
in **1989**
was that I, so to speak, opened
65,536 doors to the unknown world
of fastest computing.
That **invention** was a quantum leap
in **times-to-solution**
of sixteen orders of magnitude.
It yielded a speed increase of a factor of
two-**raised**-to-power-sixteen.
Or a 65,536-fold increase
in supercomputer speed.
My **invention** opened doors
to the then **undiscovered territory**
of supercomputing **across**
the slowest processors.

My supercomputer breakthrough
opened ten million
six hundred and forty-nine thousand
six hundred [10,649,600] doors
that led to the world's fastest computer
of today
that's powered by as many processors.
The quantum increase in speed
that I discovered is my contribution
to the development of the computer
and the supercomputer.
My speed increase made the news because
it moved the boundaries
of fastest computing forward.

My contribution to computer science enables
the world's fastest computer
to compute a million times faster
than the regular computer.

I **discovered**
how to make the world's fastest computer
a billion times **faster.**
On July 4, 1989,
I experimentally discovered

fastest computing

that's **faster** by a factor of 65,536.

That is, I moved the precursor

of the world's fastest computer forward.

And moved it

from the theoretical level of

quote, unquote

"what if it can be done"

to the practical level of quote, unquote

"how to do it."

# WHAT IS A FUNDAMENTAL CHANGE IN COMPUTING?

For thousands of years,
our human ancestors counted
with their fingers and on their toes.
Three thousand years ago,
an alternative way of counting
that used computing aids—such as
the counting board and the abacus—
was invented. That alternative way
was a fundamental change
in the way we look at the computer.
The fastest computing across
up to a billion processors
is the biggest fundamental change
in the history of the computer.
Fastest computing across

millions of processors
is supercomputing's defining
technical achievement.

Computing could be around
as long as the river flows
and the grass grows.

After my discovery,
which occurred on July 4, **1989**,
historians of computer science
can no longer mock and ridicule
the technique of fastest computing
**across** slowest processors.
They cannot dismiss it as a beautiful theory
that lacks an experimental confirmation.

What will the world be like
if we have
a massively parallel supercomputer
that's the size of the universe?

Over the past century,
the average life span increased
by about twenty years.
If that increase in life span

continues for another century,
the average person could live
to age one hundred.
In a century,
those extra twenty [20] years
could be years of living without
the threat of cancer.

## Inventing a New Supercomputer How do we upgrade a fictional supercomputer to a reality?

When I began supercomputing,
on June 20, 1974,
at 1800 SW Campus Way, Corvallis, Oregon, USA, I lacked both
the knowledge
and the 65,536 processors
that I needed to experimentally confirm
my discovery, namely
that parallel supercomputing
is not science fiction. I discovered that
the first world's fastest computing across
a billion processors
is a reality **across** a new Internet

that was a new
global network of processors.

My supreme quest was for how to execute
the world's fastest computation
—and do so not on a computer,
in and of itself—but **across**
a new global network
of identical processors
that I invented

as a new Internet, in reality.


Google suggests the greatest computer scientists of all times. With the number one spot, Philip Emeagwali is the most suggested computer pioneer for school biography reports across the USA, Canada, UK, and Africa (December 8, 2021).

# COMPUTING ACROSS AN INTERNET I'M THE ONLY FATHER OF THE INTERNET THAT INVENTED AN INTERNET.

When I came of age,
back in the 1970s and 80s,
it was science fiction to speculate on
how to execute the fastest computations.
And do so to solve
the most difficult problems in mathematics.
And solve them **across** a new Internet.
In the 1970s and 80s,
I had a geometry metaphor
for my new Internet.
In my metaphor, I visualized the cube
as inscribed inside a sphere,
with both defined and embedded
within the 16th dimension.

In hyperspace, that hypercube
and hypersphere
gave my new Internet
regular form and freedom.
Not only that, I used that form and freedom
to visualize my new Internet
as quote, unquote “parallel”
to the grand challenge
initial-boundary value problem
of extreme-scale
computational fluid dynamics
that I must solve.
This is the most difficult problem
in large-scale mathematical
and computational physics.
My discovery of 1989
of how to solve this problem
on the world’s fastest computer
enables us to understand
how COVID-19 spreads **across**
Nigerian buses
that pack passengers like sardines.

My contribution to computer science

**is this**:

On July 4, 1989, I discovered

how to compute one billion times **faster.**

And do so **across** one billion processors

that surrounded a globe

and did so just as

the Internet now encircles the Earth.

A new supercomputer creates a new science Like a

storm at sea, fastest computing **across** a million processors

has brutally pushed computer science

in a new direction

and created new fields of study.

A million processors supercomputing

in tandem

changed the course of mathematics.

My contribution

led to a deeper understanding

of the Internet of tomorrow

that could become

the supercomputer of tomorrow.

My contribution

to the world's fastest computing

**is this**:

I invented

how to email problems.

And do so one billion times **faster.**

And do so to and from

**across** one billion processors

that surrounded a globe as an Internet.

But on July 4, 1989, I recorded

the world's fastest computation.

And did so **across**

the world's slowest processors.

And **across** a new global network

of sixteen times

two-**raised**-to-power sixteen,

or **1,048,576**, bidirectional emails wires.

My wires had a **one-to-one** correspondence

to the as many bidirectional edges

of the cube

in the 16th dimension.

I visualized my sphere and cube

as embedded within

the 16th dimension
and as a hypersphere and a hypercube
within a hyperspace.

Please allow me to reintroduce myself.

I'm Philip Emeagwali. I'm a dreamer
who dreamt fiction as nonfiction.
I expanded the story of science
to become a part of that story
and the witness.

My discovery of how to harness
a billion processors
and use them to synchronously solve
the most difficult problems in mathematics
made the news headlines,
shortly after it occurred on July 4, 1989.

**How you can visualize the world's fastest computer We all use geometrical metaphors**
**every time we say:**
**on the other hand, up, or down.**
**I discovered that**
**my geometrical metaphor**
**of a hypercube that was**
**tightly circumscribed by a hypersphere**

**that was embedded in hyperspace**

**gave my new Internet**

**regular form and freedom.**

**Because of that regularity**

**and uniformity**

**in the 16th dimensional hyperspace,**

**each of my two-raised-to-power sixteen off-the-shelf processors**

**could directly communicate**

**with its sixteen nearest-neighboring processors.**

**And exchange data**

**via emails.**

**And do so with**

**its sixteen nearest-neighboring processors that shared nothing.**

**How are Philip Emeagwali's inventions used?**

A school essay question **is this**:

"How is the Philip **Emeagwali**
fastest computer used?"

My short answer is that
the supercomputer
could be as useful as the computer.

As a mathematician
who spent two decades
searching for new calculus
and new algebra, I discovered that
the supercomputer workload
from my solution
of initial-boundary value problems
of mathematical physics
—such as modelling global warming
and doing so **across**
one billion processors—increased
the speed of the supercomputer.
And increased it by a factor of one billion.
My invention
made the parallel supercomputer
the new normal.
And relegated the vector supercomputer
to computer museums.
My discovery opened the doors
that made it possible
to harness a billion processors
and use them, in parallel,
to accelerate the speeds of
compute-intensive

petroleum reservoir simulations
that were developed in the USA
and used in African oil producing nations.
My discovery was used to find
new deposits of crude oil
and natural gas
in the Niger Delta region
of southern Nigeria.
My invention was used to create
geological models
of the producing oil fields
of **Saudi Arabia**.
My invention was used to analyse data
from seismic surveys
of producing oil fields of **Russia**.

An oil producing field
is up to 7.7 miles, or 12.4 kilometers, deep.
And often the size of Alexandria, **Egypt**.
My scientific discovery that occurred
on July 4, **1989,**
in Los Alamos, New Mexico,
USA, made the news headlines.
My discovery that
the world's fastest computers

can be built from standard parts,
called processors,
was a scientific breakthrough because
it provided new knowledge
of how to distribute
and process seismic data
and do both within
and **across** compute nodes.
My discovery inspired the use
of the supercomputer
that’s powered by millions of processors.
The fastest computers are used
to simulate drilling in oil fields,
to figure out where to drill
for crude oil and natural gas,
to decide how many oil wells to drill,
and to increase the output per oil well.


father of the internet

**philip emeagwali** father of the internet
**tim berners lee** father of the internet
**vint cerf** father of the internet
**dr philip emeagwali** father of the internet
**leonard kleinrock** father of the internet
**nigerian** father of the internet
**bob kahn** father of the internet
**npr** father of the internet
**african** father of the internet
father of the internet **al gore**

Google suggests Philip Emeagwali as the father of the Internet (Labor Day 2019).

# 2ND LECTURE: THE INTERNET AS A PLANETARY SUPERCOMPUTER

**Broadcast 29 August 2021**

**https://youtu.be/JmG1zrbyHrQ**

PHILIP EMEAGWALI

INTERNET THE WORLD'S

FASTEST COMPUTER

THAT'S POWERED BY UP TO

ONE BILLION PROCESSORS

WAS AN INVENTION

THAT FOLLOWED MY

DISCOVERY OF

PARALLEL PROCESSING.

THE KNOWLEDGE OF HOW TO

SOLVE

THE SO-CALLED "GRAND

CHALLENGE"

OF SUPERCOMPUTING

AND DO SO ACROSS UP TO A

BILLION PROCESSORS PRE-

EXISTED.

BUT IT WAS UNKNOWN UNTIL I

DISCOVERED THAT PARALLEL

PROCESSING

CAN SIMULTANEOUSLY YIELD

THE HIGHEST SPEED UPS

ACROSS

AN INTERNET.

ON JULY 4, 1989, I DISCOVERED

THAT FASTEST SPEED ACROSS

A VIRTUAL SUPERCOMPUTER

# THAT'S A GLOBAL NETWORK OF 65,536 COUPLED PROCESSORS THAT SHARED NOTHING AND THAT'S AN INTERNET, IN REALITY.

The world's fastest computer
is the vital technology
that posterity must harness
and use to move humanity forward.

I came of age in the 1970s and 80s.
In those two decades,
the *terra incognita*
that was the emerging field of
fastest computing across
a million processors
was as empty as a ghost town
that had only one permanent resident.
I was that permanent resident
at the farthest frontier of fastest computing.

My new Internet was a small copy
of a never-before-understood Internet,
that's outlined and defined
by its 65,536 processors
that encircled a globe,
instead of billions of computers
around a globe.

I visualized each of my
two-to-power sixteen
off-the-shelf processors
as equal distances apart
and around a globe
in a sixteen-dimensional hyperspace.
And I visualized my ensemble
of processors
as evenly distributed **across**
the hypersurface of a hypersphere
in a sixteen-dimensional hyperspace.
I visualized my ensemble
of processors
as outlining a new Internet
which I visualized
in my sixteen-dimensional hyperspace.

What is Philip **Emeagwali** known for?

I discovered
how to combine computers
into a supercomputer
that's an Internet.
That discovery is like a light
from an ancient sky.
I'm the only father of the Internet
that invented an Internet.


father of the internet

**philip emeagwali** father of the internet
**tim berners lee** father of the internet
**vint cerf** father of the internet
**dr philip emeagwali** father of the internet
**leonard kleinrock** father of the internet
**nigerian** father of the internet
**bob kahn** father of the internet
**npr** father of the internet
**african** father of the internet
father of the internet **al gore**

Google suggests the most noted fathers of the Internet. With four out of ten searches, Philip Emeagwali is the most suggested "father of the Internet" for schools across the USA, Canada, UK, and Africa (Labor Day 2019).

## When Black People Weren't Allowed in Supercomputing

In the early 1980s, I was discouraged
from doing what white scientists
were allowed to do.
I was discouraged from programming
a forty-million-dollar vector supercomputer
that was in Camp Springs, Maryland.
I was discouraged from using
another vector supercomputer
that was in San Diego, California.
I was discouraged from using supercomputers
also bought with Black tax dollars.
Because I wasn't allowed to program
vector supercomputers,
I was forced to program only
massively parallel supercomputers,
which, in the 1970s and 80s,
were the most undesirable to program

to solve the most difficult problems

in mathematics.

## Why We Changed the Way We Look at the Supercomputer A school essay question **is this**:

"How did Philip **Emeagwali**
change the way
we look at the fastest computers
in the world?"

In the early 1980s, my unproven idea
of the fastest computing **across**
the slowest processors
was mocked and ridiculed
as a beautiful theory
that lacks an experimental confirmation.
In the 1970s and 80s,
fastest computing **across**
a new Internet
that's a new global network of
sixty-four binary thousand processors
was still in the realm of science fiction.
But on the Fourth of July 1989,
the day I discovered

the fastest speed in computing,
it didn’t matter
that I had no research budget.
Or that I was Black
and sub-Saharan African.
What mattered was that the new way
of fastest computing
fundamentally changed the way
we look at the modern computer.
And changed the way
we solve the toughest problems
in mathematics
arising in computational physics.
Or arise in large-scale
computational algebra.
And arise as the complicated
partial **differential** equation
that governs
initial-boundary value problems
at the frontiers of calculus, algebra, and physics
that define the most important applications
of the supercomputer
that’s a forty-five billion dollars
a year industry.

## My Quest for a New Internet My quest was to use

my new Internet

as my test bed for solving

the toughest problems that arise

in mathematics, science, engineering,

and medicine.

My fastest computing theory

was that

the one and only one technique

for solving the most difficult problems

in mathematics

in supercomputing

that span **across** algebra, calculus,

and physics

was to reformulate each problem.

For that reason, I chopped up

the most compute-intensive problems

into an equivalent set of

one billion initial-boundary value problems

that can then be solved **across**

one billion processors.

And solved with a one-problem

to one-processor correspondence.

To be exact, I must experimentally confirm
my world's fastest computing theory
as true and across actual processors.
At 8:15 in the morning, on July 4, 1989,
I confirmed my fastest computing theory.
I did so by executing
the world's fastest computation.
And by using my ensemble
of 65,536 processors
to solve my 65,536
initial-boundary value problems
that defined the whole
Grand Challenge Problem—including
global climate modelling
for climate changes.

My contribution to physics **is this**:

I, effectively, removed the adjective "*grand*"
from the phrase
"grand challenge problems of physics."

WORLD'S FASTEST

COMPUTING MY 1982 LECTURE

ON THE WORLD’S FASTEST

COMPUTING IN 1982, I GAVE A

LECTURE ON

THE WORLD’S FASTEST

COMPUTING.

THAT LECTURE WAS MOCKED

AS SCIENCE FICTION.

I WAS RIDICULED BECAUSE

MY THEORIZED SPEED

INCREASE OF

A FACTOR OF 65,536 ACROSS

AS MANY PROCESSORS
WAS THEN BELIEVED TO BE
IMPOSSIBLE
TO ATTAIN.
FIFTEEN YEARS EARLIER,
BETWEEN APRIL 18 TO 20, 1967,
A REVERED SUPERCOMPUTER
EXPERT,
NAMED GENE AMDAHL, QUOTE,
UNQUOTE “DISCOVERED”
AMDAHL’S LAW.
IN ESSENCE, AMDAHL’S LAW
DECREED THAT
SUPERCOMPUTING ACROSS

THE WORLD’S SLOWEST
PROCESSORS
WILL FOREVER REMAIN IN THE
REALM OF
SCIENCE FICTION.
DURING THE FOLLOWING
TWENTY-TWO YEARS,
AMDAHL’S LAW
CONVINCED SUPERCOMPUTER
MANUFACTURERS
TO CONTINUE TO USE ONLY
ONE, TWO, OR FOUR
CUSTOM-MADE PROCESSORS
TO POWER THEIR MACHINERIES.

MY THEORY WAS THAT

THOUSANDS OR MILLIONS

OR EVEN BILLIONS OF

PROCESSORS

SHOULD BE USED TO POWER

THE WORLD'S FASTEST

COMPUTERS.

ON JULY 4, 1989, I DISCOVERED

THAT

FASTEST COMPUTING ACROSS

SLOWEST PROCESSORS

IS NOT SCIENCE FICTION.

My First Execution of Fastest Computing In 1989, it

was an epiphany

for me to discover that

in my supercomputing **across**

my global network of processors

that my speed increase

of a factor of

sixty-four binary thousand-fold

would have been impossible

if I didn't communicate **across**

my new global network of email wires.

Emails married my processors together.

Emails outlined and defined

my new Internet

that enshrouded a globe.

As a mathematician

who came of age in the 1970s

and 80s,

the lesson I learned **was this**:

The ordinary genius

insists on programming only

the processors

within the network of his email wires

and processors.

The magical genius
discovers she must command
and control
all her two-**raised**-to-power sixteen,
or 65,536, processors.
She must control them
via their sixteen **times**
two-**raised**-to-power sixteen,
or 1,048,576, email wires.

How I Ended My Search for a New Internet The high-performance, massively parallel supercomputer genius who embarked on a quest for the world's fastest computer, of the 1980s, must look along sixteen mutually perpendicular directions in hyperspace. That supercomputer genius must understand how to program **across** billions of processors

that uniformly outline a globe

that's a metaphor for the Earth.

In the 1970s and 80s, I visualized myself

as a person who discovered

the world's fastest computer in hyperspace.

I visualized myself

as a programmer of the supercomputer,

or rather as a conductor

of an ensemble of billions

of processors.

That ensemble of processors

wasn't a computer, by or in itself.

That global network of processors

was a new Internet, in reality.

In 1989, I was in the news because

I was the first supercomputer conductor

to orchestrate the humongous

email communications

among my 65,536 processors.

I executed them **automatically.**

I **sent** and **received** emails **across,**

what was topologically speaking,

the surface of a globe

that had two-**raised**-to-power sixteen,

or 65,536, processors

uniformly distributed **across** that globe.

That invention was a new Internet
that I visualized as a small copy
of the Internet.

I’m the only father of the Internet
that invented an Internet.

# A DAY IN THE LIFE OF AN AFRICAN MATHEMATICIAN AN AFRICAN-BORN SCIENTIST CONDUCTING RESEARCH AT THE FARTHEST FRONTIERS OF KNOWLEDGE OF MATHEMATICS, PHYSICS, AND COMPUTER SCIENCE AND DOING SO IN THE USA NEEDS AN ENLIGHTENED AMERICAN FEMALE RESEARCH SCIENTIST WHO IS ALSO OF AFRICAN

DESCENT

AND NEEDS HER TO SUCCEED.

THAT AFRICAN-BORN

RESEARCH SCIENTIST

NEEDS THAT AMERICAN-BORN

RESEARCH SCIENTIST

AS HIS ANCHOR AND

GROUNDING FORCE.

I MET MY WIFE, DALE,

ON THE SECOND TUESDAY OF

JUNE 1978,

IN BALTIMORE, MARYLAND.

DALE WAS BORN IN BALTIMORE

AND AS AN AMERICAN OF

AFRICAN DESCENT.

WE WERE BOTH RESEARCH

SCIENTISTS

IN WASHINGTON, D.C.

IN THE 1980S, MY WIFE, DALE,

WAS AN AWARD-WINNING

SCIENTIST.

AS A RESEARCH SCIENTIST,

DALE WAS THEN BETTER

KNOWN

THAN I WAS,

AND SHE WAS MY ROLE MODEL.

The experimental X-59 aircraft was designed with the world's fastest computers. The aerospace industry purchases one in twenty supercomputers.

A question in high school essays **is this**:

"What is the contribution
of Philip **Emeagwali** to physics?"

My contribution to physics **is this**:

I extended the borders of knowledge
of modern physics
to include large-scale
computational physics
that's executed **across**
millions of processors.

In 1989, I was in the news because
I discovered how to solve
the most difficult problem
in a branch of physics
that's called extreme-scale
computational fluid dynamics.
Such compute-intensive problems
include the fastest computing
and the large-scale modeling
of the flow patterns of water and air
that occur during hurricanes
and tornadoes.
The accurate predictions
of the occurrences of hurricanes
and tornadoes
help protect lives and properties.
I discovered how to execute
the fastest computing
of aerodynamic flows
that must be used to design
hypersonic aircraft.
I discovered how to compute in tandem large-scale codes
in computational fluid dynamics.
The fastest computational

fluid dynamics codes
must be used to design
the most efficient shape
that reduces the drag
on a submarine and an automobile.
I solved that initial-boundary value problem
that's governed by
partial **differential** equations
at the frontiers of calculus
and computational fluid dynamics.
And I solved it by drawing on
both my physical
and geometric intuitions,
both as a physicist and a geometer.
And drawing on
my mathematical analogies
between meteorology and geology
and creating metaphors between the globe
in the 3rd and 16th dimensions.

How I Wind Down After Work In the late afternoons
from the late 1970s,
through the 80s and the 90s,

I decompressed by jogging **across**

the Rock Creek Trail

of Silver Spring, Maryland.

Or playing tennis in Corvallis, Oregon,

or at the two tennis courts

that were next to the Penumbra Theater

of Saint Paul, Minnesota.

In the early 1990s, I stayed physically fit

by jogging up to fifty miles a week.

I trained for 26-mile marathon races

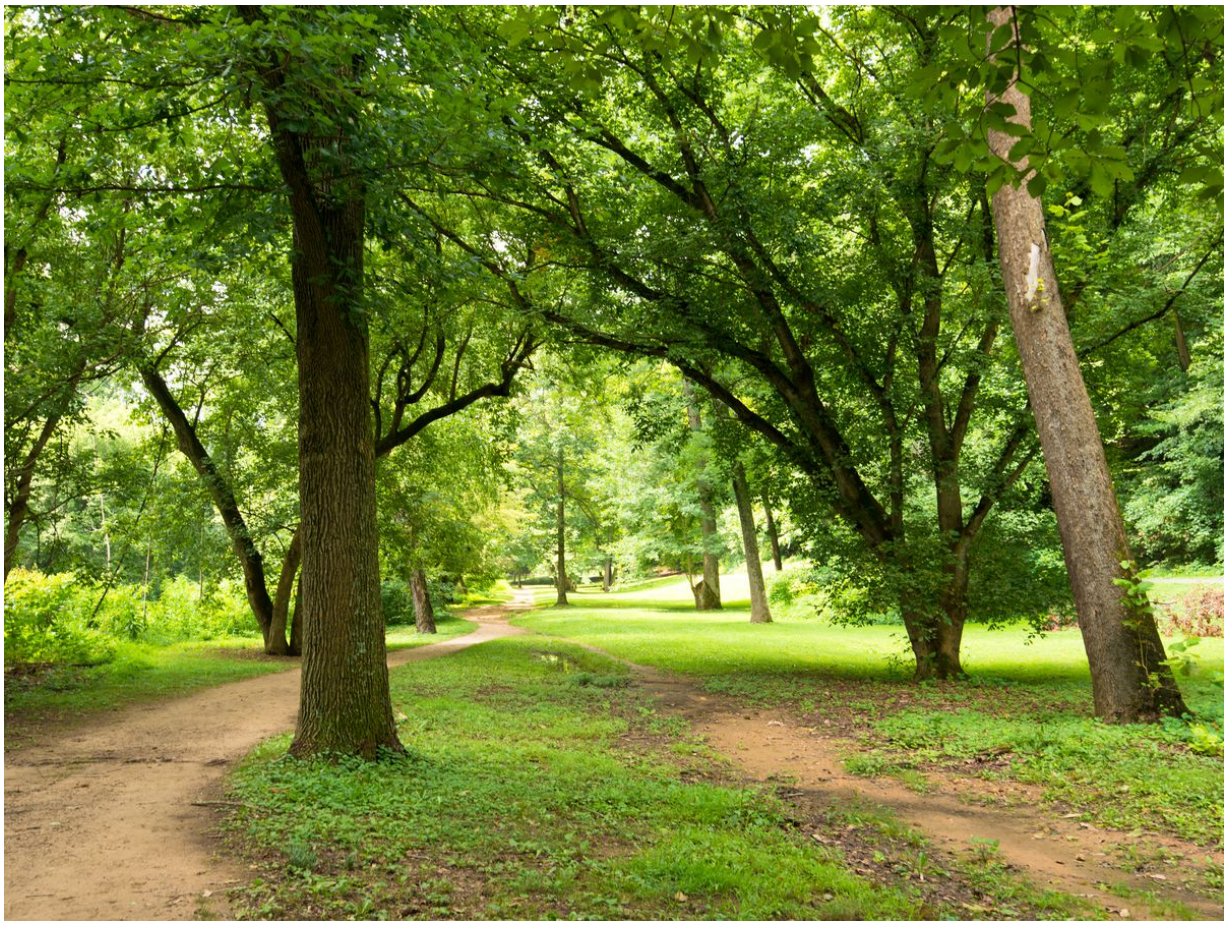
and did so around the

seventy-and-half [70.5] acre **Lake Como**

that was my backyard

of The Burlington of **Energy Park**

of Saint Paul (Minnesota).



In the late 1970s, I jogged for three hours across Rock Creek Park of Washington, D.C. Now, I hike and bike in upstate New York. [Photo: Rock Creek Park]


Back in the early 1990s, I jogged up to forty miles a week around Como Lake, Saint Paul, Minnesota.

# A DECADE IN THE LIFE OF A PHYSICIST

"What's a decade in the life of a physicist?"

As a research physicist,
my specialty was fluid dynamics, particularly, large-scale computational hydrodynamics.

Back from September 1, 1981,
through August 1986,
I lived a 15-minute stroll
from the Gramax Heliport Building
in Silver Spring, Maryland.
The Gramax Building
was an approved landing pad
for helicopters. The Gramax Building
was the then headquarters
of the U.S. National Weather Service.

During those five years,
and from Mondays through Fridays,
I stopped each morning
and spent five hours
with hydrologists and meteorologists.
I did so on my way to the nearby
Metro Station of Silver Spring, Maryland.
From Metro Station and after lunch,
I rode a small shuttle bus
to College Park, Maryland
where I spent the rest of my day
in research seminars
given by visiting mathematicians, physicists, and computer scientists.
At about six o'clock in the evening,
I played tennis at one of the fourteen
lighted tennis courts
at the nearby Fieldhouse Drive
of College Park, Maryland.
During my five years—from 1981
to 1986—with research meteorologists,
I was inspired to investigate
the finite difference discretizations
of the primitive equations of meteorology

that were used by the U.S.
National Weather Service
and used to forecast the weather.
Earlier and before my arrival
at the U.S. National Weather Service,
and in the three years
that were inclusive
from 1978 through 1981,
I researched in the fluid dynamics
of both free surface water flows
and subsurface flows of crude oil,
injected water, and natural gas
that were flowing through porous media.
A typical porous medium
is an oil producing field
that can be up to 7.7 miles,
or 12.4 kilometers, deep.
In those three years,
I lived in the bustling Adams-Morgan neighborhood.
And in the Meridian Hill Hall
that was next to the Malcolm X Park
and along the 16th Street
of Washington, District of Columbia.

During the ten years
that followed June 5, 1977, I moved around
and between
Washington (District of Columbia), Baltimore (Maryland),
Silver Spring (Maryland),
College Park (Maryland),
Casper (Wyoming),
and Laramie (Wyoming).
In those ten years and those cities,
I attended about five hundred
advanced scientific lectures.
It was a rare achievement
for a supercomputer scientist
to attend that many seminars.
Each seminar was at the frontiers
of knowledge in mathematics, physics,
and computer science.
Attending those five hundred
scientific lectures
enabled me to have far more knowledge
and command of my materials
than any supercomputer scientist
on YouTube.
And to become

the **multi**disciplinary mathematician

who posted one thousand

**multi**disciplinary videos

on the **Emeagwali** YouTube channel.

That was the reason

I was described me as an auto**di**dact,

and the person who invented

the world's fastest computing

**across** up to a billion processors.

In the late 1970s, I lived in Adams Morgan, Washington, D.C. The legendary Kilimanjaro Restaurant and Club was located here. It was where Africans party.

MY QUANTUM LEAPFROG TO FASTEST COMPUTING IN THE 1970S AND 80S,
IT WAS IMPOSSIBLE TO SOLVE THE MOST DIFFICULT PROBLEMS
IN MATHEMATICS AND PHYSICS —SUCH AS FORECASTING THE WEATHER—AND SOLVE THEM ACROSS A MILLION PROCESSORS.
FOR THAT REASON, I HAD TO INVENT, NOT LEARN,

# HOW TO SOLVE
# THE WORLD'S BIGGEST
# PROBLEMS
# BY EXECUTING
# THE FIRST WORLD'S FASTEST
# COMPUTING ACROSS
# THE WORLD'S SLOWEST
# PROCESSORS
# THAT SHARED NOTHING WITH
# EACH OTHER.
# LIKE OTHER INVENTORS, I
# INVENTED
# FASTEST COMPUTING
# WITHOUT THE BENEFIT OF A

# SUPERCOMPUTER INSTRUCTOR. THAT IS, I WAS THE FIRST PERSON TO UNDERSTAND HOW TO HARNESS THE WORLD'S FASTEST COMPUTING, AS WE KNOW THE TECHNIQUE TODAY!

In the 1980s, I attended
five hundred lectures
on the latest scientific discoveries.
Each lecture was delivered
by the discoverer or inventor
who was a leading mathematician
or physicist or computer scientist.
After ten years of daily conversations

with the foremost thinkers
at the frontiers of knowledge,
I became a **multi**disciplinary mathematician who can discover
new physics
and invent a new computer
that's fastest.
That was how I became known
for my contributions
to the development
of the world's fastest computer.
I discovered the world's fastest computer **across**
the slowest processors in the world.
I discovered the world's fastest computer
on the Fourth of July 1989,
in Los Alamos, New Mexico, USA,
and **across** an ensemble
of 65,536 processors.

## Philip Emeagwali Internet as the World's Fastest Computer

A question in school essays **is this**:
"What is the Philip **Emeagwali** Internet?"

I visualized my new Internet
as a new global network of
sixty-four binary thousand,
or 65,536,
off-the-shelf processors.
That Internet was married together as one seamless, coherent,
and gigantic supercomputer.
And married by one binary million
email wires, or 1,048,576 wires,
that were uniformly distributed
around a globe.
But I visualized my globe
to be shaped as what mathematicians call
a hypersphere
in the 16th dimensional hyperspace.

## Emergence of a Planetary Supercomputer

My discovery of a new Internet
that's a new global network
of processors
and that's a new supercomputer
was a moment of revelation and insight.
I discovered how to harness

the trillions of processors
and the billions of computers
that could outline and define
the Internet of the future.
I discovered
how the planetary supercomputer
of forthcoming centuries
could look like.
A planet-sized supercomputer
that harnesses all the processors
and computers on Earth
and uses them to solve
a difficult problem in mathematics
and physics
must, by necessity, require that
all emails be at once sent
and synchronously received **across**
the Earth. The processing nodes
of that planet-sized supercomputer
must be uniformly distributed **across**
the Earth.

That scientific discovery
was my Eureka moment of revelation.
It helped me to understand
that harnessing a billion processors
is the key to making
the supercomputer **fastest**.
That scientific discovery
was how I gained insight
into the essential meaning
of a global network
of off-the-shelf processors
that were coupled and identical
to each other.
It was a global network
of identical email wires
that I visualized
as tightly circumscribing a hyper-globe
in **hyperspace**.
That new technology was a new Internet that was comprised of
65,536 processors.

## Planetary Supercomputer from the Internet

In 1989, I
was in the news because
I discovered that those

sixty-four binary thousand processors
can be used to emulate one seamless, coherent, and gigantic
processor
that was at the processing core
of the world's fastest computer.
That new computer and new Internet
are like two sides of the same coin
that are different
but, yet, congruent and necessary.
The head side of the coin contains
the ensemble of processors.
The tail side of the coin contains
the ensemble of email wires.
The head and tail sides
are married to each other
to form the new Internet,
called the **Philip Emeagwali** Internet.

I'm the only father of the Internet
that invented an Internet.

A new supercomputer
was born at 8:15 in the morning

of July 4, 1989, in Los Alamos,
New Mexico, USA.
That new supercomputer
used the slowest processors in the world
to execute the fastest processing
in the world.
That new supercomputer
fundamentally changed the way
we look at the computer.
The world's fastest computer
consumes enough power
to run ten thousand (10,000) homes.

A supercomputer communicates **across**
up to 200 miles of cables.
The world's fastest computer occupies
eight thousand square feet
of floor space.
And comprises of hundreds of racks, millions of processors,
endless wires,
and blinking lights.
That new supercomputer
is not a computer, by or in itself.

That new supercomputer
is a new Internet, in reality.

In a dream, my new Internet
appeared to me like a deity.
That supreme power enshrouds the Earth
as an electronic cloth. I imagined that deity
to be the global, planet-sized **SuperBrain**
for our descendants
of forthcoming millennia.
That **SuperBrain** could be
a billion trillion coupled,
super intelligent processors.
My epiphany was the Eureka moment
when I comprehended that
the Internet of **Year Million**
could evolve to become the core
of the Earth-sized supercomputer
of our posthuman Gods.

## When a Science Fiction Becomes a Supercomputer

For the past century, weather forecasting
—the precursor to climate modelling—was the poster boy of the
list of

the most difficult problems
in mathematics and physics.
Fastest computing **across** a globe
was speculated and entered
into the realm of science fiction.

And did so when it was first published
on February 1, 1922.
Fast forward sixty-seven years,
I was in the news because
breaking that supercomputer
speedup barrier
was computing's equivalence
of being the first person
to summit the peak of Mount Everest,
or climb to the top of the world.

The science fiction of today
could become
the non-fiction of tomorrow.

On February 1, 1922,
a science-fiction human supercomputer
was described as 64,000 humans
calculating together to forecast the weather

for the entire Earth.
I stumbled onto that science-fiction story
while I was working as a university librarian
in Monmouth, Oregon, USA, in the summer of 1974.

I reformulated that idea of 1922
as the first world's fastest computing across an Internet.
I visualized my new Internet
as a new global network of
64,000 computers.
Back in 1974, my Internet was mocked
as a blue-sky thinking.
In that decade, fastest computing **across**
up to a billion processors
remained in the realm of science fiction.

Sixty-seven years later,
on the Fourth of July 1989,
that science fiction manifested as a nonfiction **across**
a new Internet.
I visualized the Philip **Emeagwali** Internet
as a new global network of
sixty-four binary thousand processors
around a globe.

I visualized that globe as a **hypersphere**
in a sixteen-dimensional **hyperspace**.

## My Contributions to Weather Forecasting

My
visualization differed
from the sixty-four thousand
human computers around a globe
in three-dimensional space.
After the Fourth of July 1989,
fastest computing across
up to a billion processors
—or using one million processors
to solve the same problem
and do so **at once**—
left my experimental
supercomputing laboratory.
My invention, or new knowledge,
entered every supercomputer
that has been manufactured
since my scientific discovery of **1989**.

A question in school essays
on famous physicists and their discoveries **is this**:

“What did Philip **Emeagwali**
contribute to physics?”

My discoveries and contributions to physics
are these:

The slowest processors in the world
can be used to manufacture
the fastest computers in the world
that can be used to solve
the most difficult problems in physics.

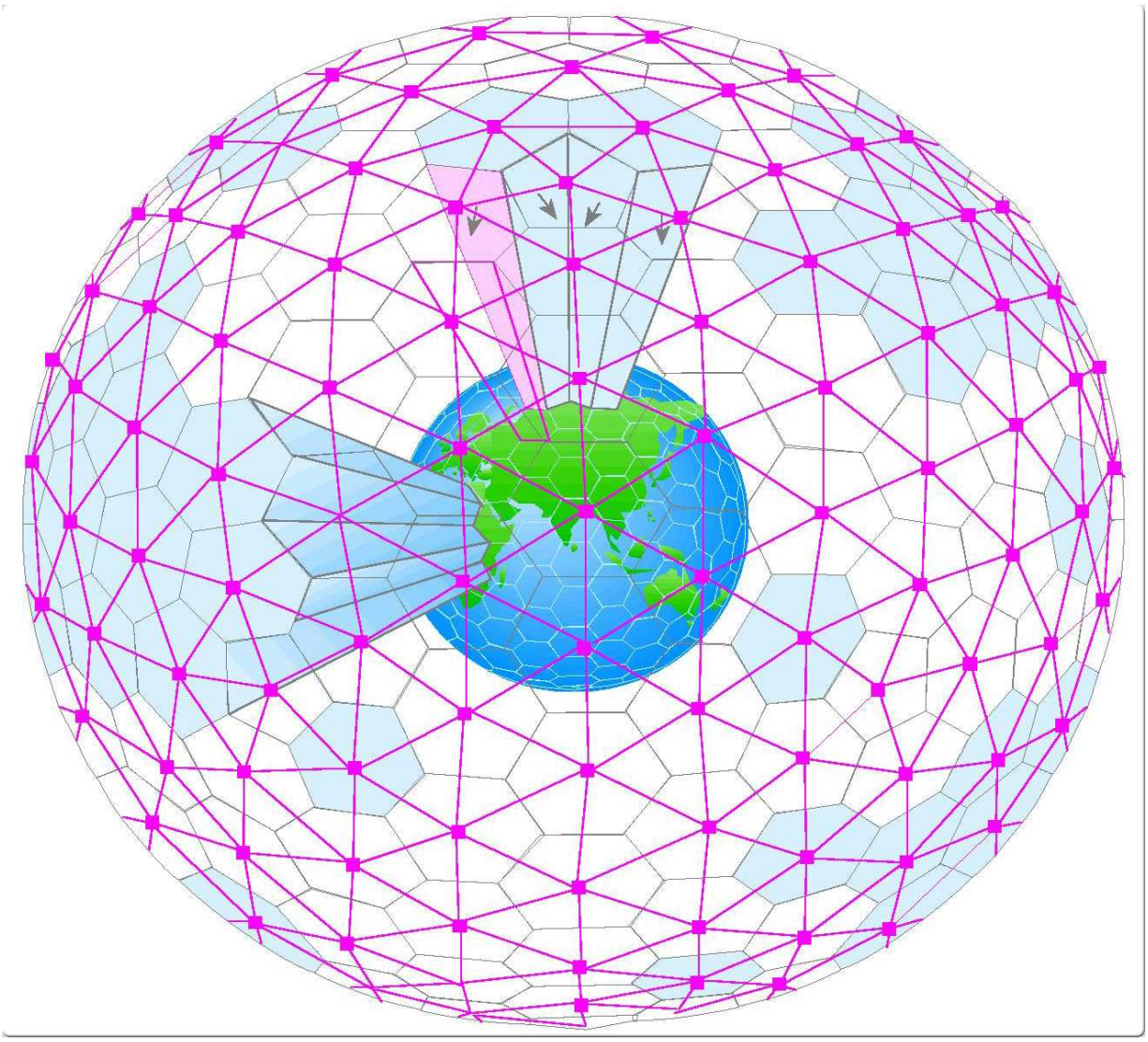
In 1989, I was in the news because
I discovered that up to one billion
self-contained processors
could be utilized
to forecast tomorrow’s weather.
And deeply understand
next century’s climate change.

# FATHER OF THE INTERNET

Philip Emeagwali Internet

I invented the Philip Emeagwali Internet.
But it was renamed and credited
to a white inventor.
I solved the most difficult problem
in computational mathematics.
And I solved it alone.
That Grand Challenge Problem, namely
the world's fastest computing across
the world's slowest processors,
to answer the world's biggest questions
was indirectly and first posed
seven decades earlier.

I was the first person to sketch
a new Internet



My original sketch of the Internet. It was conceived in 1974. I was the first person to sketch a new Internet.

The idea that suddenly the Internet
was invented in the 1970s
just doesn't ring true.
That said, I was the first person to sketch
a new Internet. My new Internet

was a global network of processors
that emulated one seamless, coherent,
and gigantic supercomputer.
My invention made the news headlines because it materialized
as the world's fastest computer.
For the fifteen years following 1974,
my not-so-fully formed hypothesis,
that was published on February 1, 1922,
continuously grew in my mind.
It became my fully formed theory
that I constructively reduced to practice.
It physically materialized
as my new **global** network
of the sixty-four binary thousand
slowest processors in the world
that seamlessly computed
as one coherent supercomputer
that became the world's fastest computer.

## A Fundamental Change in Computational Physics

Someone asked:

"What's the most fundamental change
that occurred in computational physics?"

A century ago, the physics model
of the spread of the coronavirus disease
could only have been formulated
on the blackboard.
Half a century ago, the spread of COVID
could be modelled on a computer
that was powered by only one processor.
Today, a supercomputer
that is powered by up to
ten million processors
can be used to model the spread of
COVID-19 **across** a Nigerian bus
that packs passengers like sardines.
That sea change from modelling
on a blackboard to a motherboard
to the world's fastest computer
is the most fundamental change
in computational physics.
It was a quantum shift
from the February 1, 1922, science fiction and paradigm of sixty-
four thousand human computers
that were quote, unquote
"racing" the weather for the **globe.**
My 1974 theory

of the world’s fastest computer
was about as many processors,
or computers, working together
to solve the most difficult problems
in mathematics and physics.
And solve them **across**
my ensemble of processors
that were evenly distributed
around a **globe.**
My discovery of the first supercomputing
**across** the world’s slowest **computers**
occurred at fifteen minutes after 8 o’clock in the morning
of July 4, 1989, in Los Alamos,
New Mexico, USA.
In 1989, I was in the news because
I discovered that
two-**raised**-to-power sixteen, or 65,536, processors,
or as many electronic computers,
that were **uniformly** distributed
around the hypersurface of a **globe**
in a sixteen-dimensional **hyperspace**
can be deployed to **uniformly** compute
more accurate climate models
around the **globe.**

That is, I discovered that

a multitude of ordinary processors

could be used to foresee otherwise unforeseeable long-term global warming.

## A Father of the Internet



Google suggests the most noted fathers of the Internet. With four out of ten searches, Philip Emeagwali is the most suggested "father of the Internet" for schools across the USA, Canada, UK, and Africa (Screenshot on Labor Day 2019).

In Google searching for quote, unquote
"Father of the Internet,"
the first name that's suggested
is "**Philip Emeagwali.**"

My signature discovery
that made the news headlines,
in 1989,
was my experimental confirmation
of my 1974 paradigm
of the world's fastest computing
executed around a new Internet
that's a new global network of
65,536, or two-**raised**-to-power sixteen,
off-the-shelf processors.
I visualized my processors
as uniformly distributed around a
sixteen-dimensional globe
that's embedded
inside a sixteen-dimensional hyperspace.
In the decade and a half,
that followed June 20, 1974,
on a supercomputer
that was at 1800 SW Campus Way,

Corvallis, Oregon, USA,

I visualized my globe

in the sixteenth **extraordinary** dimension,

rather than in the third [ 3rd ]

ordinary dimension.

We need to change the way we look at the Internet In

my new paradigm

of the world's fastest computing

executed around a new Internet

that uniformly encircles a globe

in the 16th dimension,

I visualized my 65,536 processors

as two-**raised**-to-power sixteen processors

in which each processor

was directly connected

to its sixteen nearest-neighboring processors.

Those processors shared nothing

and each operated its operating system.

As the first mathematician

to program an ensemble

of 65,536 processors

and use them to solve

one of the most difficult problems

in mathematics and physics,

my grand challenge was to figure out

how to marry millions, or billions,

of ordinary processors together.

And marry them as one seamless, coherent, and gigantic

supercomputer.

And marry them together

by their sixteen **times**

two-**raised**-to-power sixteen,

or 1,048,576, or one binary million,

email wires.

I used emails to send and receive

intermediate answers

to my testbed physics-inspired problem.

My testbed problem

was an initial-boundary value problem

of mathematical and computational physics

that was governed by a system of

partial **differential** equations

beyond the frontier of calculus

and fluid dynamics.

THE FIRST SUPERCOMPUTER
SCIENTIST AS THE FIRST PILOT
TO QUOTE, UNQUOTE “FLY”
THE WORLD’S FASTEST
COMPUTER
THAT WAS POWERED BY
SIXTY-FOUR BINARY THOUSAND
PROCESSORS,
I ASKED THE TRAFFIC GUYS TO
SHOW ME LIGHTS
FROM THE GROUND. REALIZING
THAT I WAS BLACK
AND AFRICAN,

THEY TURNED OFF ALL THE
LIGHTS. FORTUNATELY,
I WAS AN INSTRUMENT-RATED
PILOT
WHO COULD LAND AIRPLANES
BLINDFOLDED.
IN THE 1980S,
I PROGRAMMED A NEW GLOBAL
NETWORK
OF 65,536 COUPLED PROCESSORS
WHICH POWERED A NEW
SUPERCOMPUTER
THAT I DEFINED AS A NEW
INTERNET.

I PROGRAMMED MY
PROCESSORS BLINDFOLDED.
IN THE 1980S, I WAS THE
REMOTE PROGRAMMER
OF SIXTEEN OF THE MOST
MASSIVELY PARALLEL
SUPERCOMPUTERS IN THE
WORLD.
I WAS LOGGED ONTO
SUPERCOMPUTERS
24/7.
FOR PARALLEL PROGRAMMING,
I WAS KNOWN AS THE GO-TO
PERSON

WITHIN THE SUPERCOMPUTING
COMMUNITY
THAT INCLUDE FROM
THE SUPERCOMPUTER CENTERS
IN SAN FRANCISCO
(CALIFORNIA)
TO OAK RIDGE (TENNESSEE)
TO CHICAGO (ILLINOIS)
TO CAMBRIDGE
(MASSACHUSETTS)
TO WASHINGTON (DISTRICT OF
COLUMBIA).
HOWEVER, SUPERCOMPUTER
SCIENTISTS

# IN THOSE CENTERS WHO KNEW ME
# BY NAME ONLY ASSUMED THAT PHILIP EMEAGWALI
# WAS A WHITE SUPERCOMPUTER SCIENTIST
# WITH AN EASTERN EUROPEAN LAST NAME.

## I Changed the Way We Look at the World's Fastest Computers

For me, the emerging paradigm
is fastest computing **across** a new Internet
that is described as the
Philip **Emeagwali** Internet.
I visualized my new Internet
as a new global network of processors.
In my mathematical theory,

my globe was embedded

within my sixteen-dimensional hyperspace.

But in my world's fastest computing,

my globe in hyperspace

was quote, unquote "etched"

onto the three-dimensional space.

I was in the news

for experimentally discovering

how to compute and communicate **across** my new Internet.

My Internet surrounded

a metaphorical globe in the 16th dimension.

And did so just as the Internet circumscribes the Earth

in the 3rd dimension.

I was in the news because

I theoretically and experimentally discovered

how to make fastest computing across

slowest processors useful

and harness it to solve everyday problems,

such as your evening weather forecast

or foreseeing the spread of COVID-19.

My discovery

of the world's fastest computing

remained my signature contribution

to mathematics, physics,
and computer science.

# 3RD LECTURE: INVENTING THE FIRST SUPERCOMPUTER

**Broadcast 29 August 2021**

**https://youtu.be/p6REP9kI7_U**

FATHER OF THE INTERNET I BEGAN SUPERCOMPUTING ON JUNE 20, 1974, AT 1800 SW CAMPUS WAY, CORVALLIS, OREGON, USA. IN DECEMBER 1965, THAT SUPERCOMPUTER, IN CORVALLIS, WAS RATED AS THE WORLD'S FASTEST COMPUTER.

I WAS PROGRAMMING A SUPERCOMPUTER

THAT WAS FASTER THAN THE ONE

THAT HELPED PUT A MAN ON THE MOON,

BACK ON JULY 20, 1969.

BECAUSE I WAS BLACK AND AFRICAN,

I WAS FORCED TO WORK FULL TIME AND ALONE

ON MY RESEARCH

ON HOW TO COMBINE COMPUTERS

INTO SUPERCOMPUTERS

AND DID SO FOR SEVENTEEN YEARS

AND WITHOUT ANY PAYMENT

THAT WAS IN PROPORTION

TO WHAT AMERICAN BILLIONAIRES WERE PAID.

After working full time and without pay
for those seventeen years,
I felt that keeping the entire credit
for my invention
is the only reward that I can have.
It was like **Chinua Achebe,**
who is the father of African literature,
foregoing his author royalties
but insisting that he alone be credited
as the author of "Things Fall Apart."
And it was like **Fela Kuti**

foregoing his songwriting royalties

but insisting that

he is the “Father of Afrobeat.”

I’m the father of

the world’s fastest computing,

as it’s known today.

And I am the only father of the Internet

that invented a new Internet.



Google suggests the most noted fathers of the Internet. With four out of ten searches, Philip Emeagwali is the most suggested “father of the Internet” for schools

across the USA, Canada, UK, and Africa (Labor Day 2019).

## Surviving the Death of One in Fifteen Biafrans

### A question in school essays **is this:**

"What was Philip **Emeagwali**'s
education like?"

I was born on August 23, 1954,
in Akure, in the western region
of the British West African colony
of Nigeria.

In January 1960 and at age five,
I enrolled in first grade
in Saint Patrick's Primary School,
Sapele, Nigeria.
Several students in my class
were twice my age.
My seventh-grade school photos,
that I posted on my website, reveal that
some of my classmates
were twice my age.

From January 1960 to March 1974,
I attended, on-and-off, six schools
within Nigeria.

But I dropped out of school
for five of those fourteen years.
I'm often invited to alumni reunions
and remembered
as the school's most gifted student.
For that reason, my former classmates
were not surprised when I told them that
I won a scholarship to the USA.
My scholarship took effect
on September 10, 1973.
After a six months delay, I arrived in
36 Butler Hall, Monmouth, Oregon.
And on the evening of Sunday
March 24, 1974.

Twelve hours after my arrival,
I had a conference
with a brilliant American mathematician,
named Beryl M. Green.
My goal was to become a mathematician
and Beryl M. Green
was assigned as my mentor.
To my surprise, we couldn't understand what each other was saying.

At that time, I could only understand
the spoken Nigerian and British English.
And Beryl M. Green could only understand
the spoken American English.
In retrospect, I should’ve anticipated
my difficulty. But I did not.
Looking back to the early 1970s,
there were no television
in the eastern region of Nigeria,
where I then lived.
The first time, I listened intently
to the spoken American
was in about May 1973.
And during the listening portion
of the American TOEFL, the acronym
for Test of English as a Foreign Language.
I took TOEFL
at The Hope Waddell Training Institution, Calabar, Nigeria.
Not surprising, I failed the listening portion of TOEFL.
In the early 1970s, Nigerians arriving
in the USA, for the first time,
could not understand
the spoken American English.

It took me several weeks
to understand the American English.
So, on my first day in the USA,
I wasn’t sure what language
the mathematician Beryl M. Green
was speaking.
And he felt the same way about me.
For several minutes,
we starred at each other
and looked confused.

To introduce myself, I grabbed a chalk from his desk,
walked to his blackboard
and scribbled a difficult problem mathematics. I derived its solution.

That impressed him. He said that I should go far in the field of mathematics.

The following day, Beryl M. Green,
secured a second scholarship for me.
He advised me to transfer,
twenty miles away,
from Monmouth to Corvallis, Oregon.
That I was how I came to Kidder Hall, Corvallis, a building that housed

the most brilliant mathematicians
in Oregon.
Directly opposite from Kidder Hall
was the building that housed
the only supercomputer in Oregon.
Three months later,
I began supercomputing.

Back in 1970, in Christ the King College, Onitsha, Nigeria,
I was well known
but only known
by my nickname “Calculus,”
not by my birth name **Philip Emeagwali**.
Calculus is the powerful technique
that must be used to solve
the most difficult problems in physics.
Such grand challenge problems include
the computational fluid dynamics models
that’re used to determine
the best social distancing measures
that will reduce the spread of
the coronavirus disease.
Fast forward twenty years into the USA,

I was in the news as the mathematician
who contributed to calculus.

Outside Nigeria, I attended six universities, with each claiming me as its
notable alumnus.
The last university that I attended
has 610,000 living alumni
who it sends a quarterly update
on the best minds on the university campus.
The February 1991 issue
of *Michigan Today*
was a tribute issue (see link https://emeagwali.files.wordpress.com/2018/10/philip-emeagwali_university-of-michigan_michigan-today_february-1991.pdf )
by the University of Michigan
on its most renown scientist named
"**Philip Emeagwali**."

So I won early acclaim as a genius and did so across the length and breadth of the state of Michigan.

At that time, it was very offensive
to white scientific communities
for a white American university

to glorify a black sub-Saharan African
as smarter than Albert Einstein.
For that reason, only the portraits
of white male scientists
were allowed to be exhibited
on their wall of geniuses.
In 1989, I was the first scientist,
black or white, to be described
as smarter than **Albert Einstein**.
I became an intellectual threat that must be suppressed at all cost.
I was controversial because
I did not meet their whiteness criterion
that was the requirement
to being called a genius.
To this day, the university upholds
its tradition
of only naming buildings
after obscure white male scientists.
As well as only displaying the portraits
of obscure white historical figures.
And displaying them with the intent
to lower the self-esteem
of its underrepresented students.

What's a day in Biafra like?

A question in school essays **is this**:

"List three interesting events
in the life of **Philip Emeagwali**."

I dropped out of school, for five years,
between ages twelve to nineteen.
I dropped out to live in refugee camps
of Biafra of the Nigerian Civil War.
One in fifteen Biafrans died
during that 30-month-long war.
In the list of the worst genocidal crimes
of the 20th century
that were committed against humanity,
the death of one in fifteen Biafrans
was ranked fifth.

When the Nigerian Civil War began,
my father's residential address
was at 4B Egbuna-Adazie Street,
**Odoakpu**, Onitsha, Biafra.
In late 1967, the **Fegge**
and **Odoakpu** Quarters
of **Onitsha** were deserted,
except for full-time looters

and trophy hunters.

After the attack of October 12, **1967,**

and during the five-and-half months

that preceded March 20, **1968,**

downtown Onitsha became a ghost town.

At that time, it’s downtown

wasn’t a safe place to visit alone.

# THE DAY OF THE LONG NIGHT!

On March 20, 1968,
refugees living in Énú Ọnịcha,
called Inland Town,
noticed the sudden influx
of thousands of frightened Biafran soldiers.
Some of those Biafran soldiers
confided to their refugee relatives
in Énú Ọnịcha
that they were fleeing
from the nearby Abagana battlefield.
Those Biafran soldiers were fleeing
beyond Onitsha and towards Oba
and Nnewi.
Unknown to us, namely
the Biafran refugees in Onitsha,

was that the Biafran soldiers
who should protect us
were routed by the Nigerian Army
and were disorganized.
Biafran soldiers defending Onitsha
fled hastily.
And fled without alerting us
—the 15,000 refugees in Énú Ọnịcha—
to join them in their flight to safety.
During that 30-month-long war,
both the Nigerian and Biafran soldiers
killed their civilian captives,
and their war prisoners.
That was one reason
one in fifteen Biafrans died
in thirty months!

Benjamin Adekunle

In 1968 and at the war front inside Biafra,
Colonel **Benjamin Adekunle**,
also known as “black Scorpion,”
who led the Third Marine Commando
told a French radio reporter:

And I quote

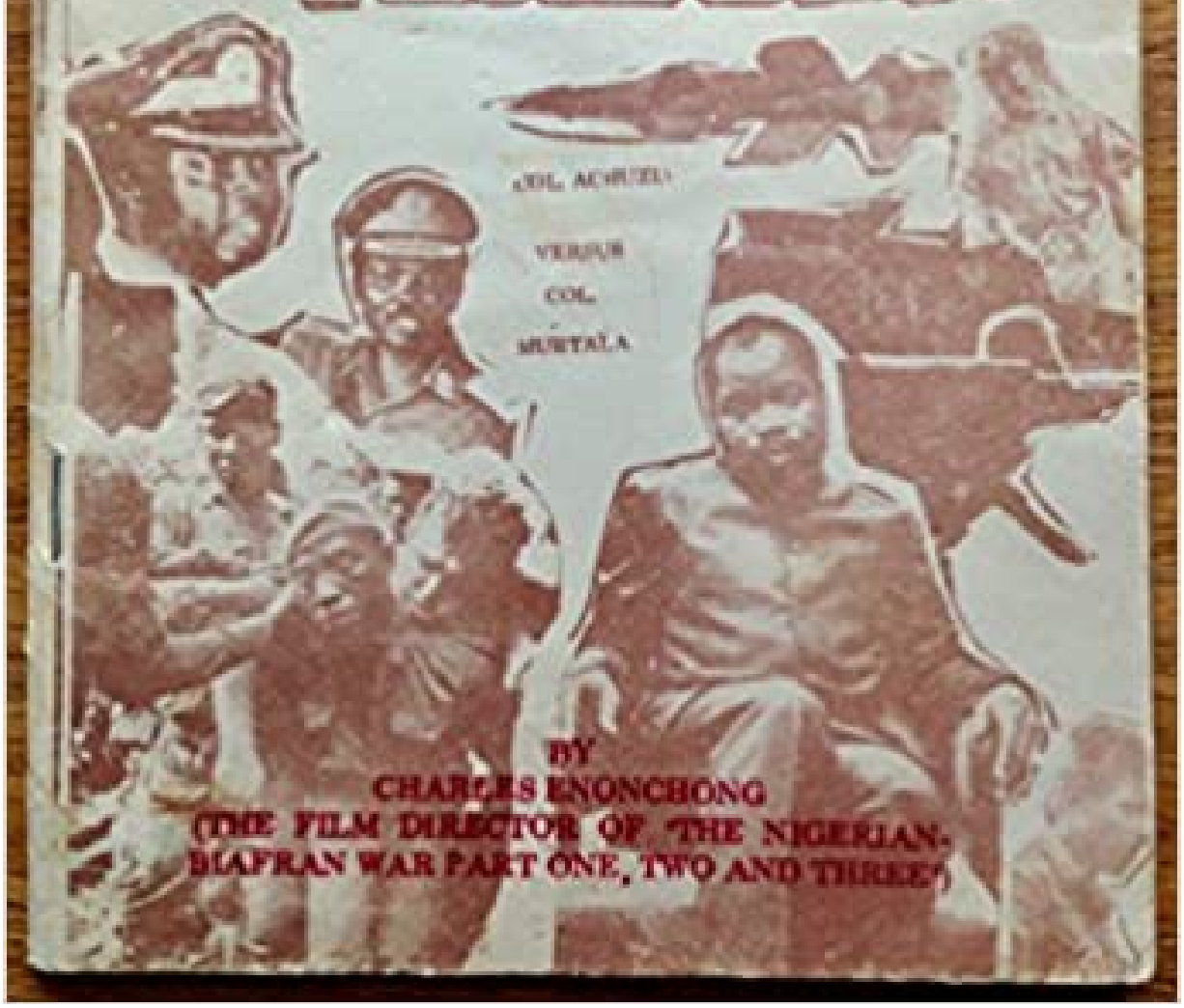
“We shoot at everything that moves
and when our troops
march into the center of Ibo territory,
we shoot at everything
even at things that do not move.”

End of quote

THE GREATEST BATTLE OF THE NIGERIAN–BIAFRAN WAR

PRICE N3

# THE ABAGANA AMBUSH




BY
CHARLES ENONCHONG
(THE FILM DIRECTOR OF THE NIGERIAN-BIAFRAN WAR PART ONE, TWO AND THREE)

Unknown to the 15,000 refugees
who sought safety in *Énú Ọnịcha*
thousands of Nigerian soldiers
were rapidly thundering
from Abagana to Onitsha.
The Nigerian Army had superior firepower
while the Biafran soldiers
had run out of bullets
and were rapidly retreating
from the Abagana War Front.

We Were Biafra's Human Shields

One of the dark secrets
of the Nigerian Civil War **was this**:

On March 20, **1968**, the Biafran Army
used the 15,000 refugees in **Onitsha**
as their human shields.

The Biafran soldiers fleeing from Onitsha
had ample time to evacuate
those refugees.
The Biafran government

used those 15,000 refugees

who were *Onitsha indigenes*

as its human shield.

The Biafran government capitalized

on the certain deaths of refugees.

And tendered them

as proof of Nigerian genocide

against Igbos.

## My First Eight Days at the Onitsha Battlefield

Six months earlier, we were refugees

at 6C Wilkinson Road, Onitsha.

That address was next to

Obi Okosi Primary School.

That school was closed and converted

as the military barrack

of one thousand Biafran soldiers.

The invading Nigerian Army

considered that Biafran military barrack

—and by extension

our homes that were next to

that barrack—to be their legitimate

military target Number One.

And in the early morning

of October 12, **1967,**

and as a thirteen-year-old,

I was fleeing along Wilkinson Road, Onitsha,

carrying a heavily loaded tin-pan

on my head.

And fleeing with my mother

and six younger siblings

and fleeing towards **Ogidi**,

that was seven miles away.

As I turned right into Wilkinson Road

and towards Ogidi, I looked to my left

and towards Metropolitan College

and saw what seemed to be a

house-to-house combat.

I saw a Biafran soldier

crouching with his Setima gun

and firing towards Metropolitan College.

Unknown to us, the Nigerian Army

was attempting to capture

the Biafran military barrack

that was headquartered

at Obi Okosi Primary School

of Umuasele Quarter of *Énú Ọnịcha*.

That was a shouting distance

from our residence

at 6C Wilkinson Road, Onitsha.

As we continued our flight

and a few seconds later,

a bullet casing fell two feet in front of me

and on the then untarred Wilkinson Road.

Another minute later,

I saw two Biafran soldiers

whom ten minutes earlier

I saw hiding in the bush

behind our house

at 6C Wilkinson Road.

I saw those two soldiers

remove their Biafran Army uniform

and change into civilian clothes.

Like a thousand Biafran soldiers

did that early morning,

those two soldiers fled because

the better armed Nigerian Army

had attacked their military barrack.


Colonel Murtala Mohammed, former president of Nigeria.

Looking back retrospectively,

the Nigerian Army

implicitly gave the civilians

who were living in *Énú Ọnịcha*

eight days forewarning

to flee from *Énú Ọnịcha*.

Those were the eight days
of continuous artillery shelling of **Onitsha**
that originated from the banks of
the River Niger at **Asaba**.
The Biafran Army
had eight days to evacuate refugees
from the Inland Town quarter of **Onitsha,**
called *Énú Ọnịcha***,** to safer villages,
such as **Ogidi** or **Nnewi**.
Instead of evacuating the refugees
from the Onitsha War Front,
the Biafran Army used those
fifteen thousand *Ndi Ọnịcha* refugees
as their human shields.
Those fifteen thousand human shields,
included my 28-year-old mother, myself,
and my six siblings of ages one to eleven.
We were among
the fifteen thousand refugees
who fled, back on October 4, **1967**,
from the Fegge
and Odoakpu Quarters
of downtown Onitsha
to *Énú Ọnịcha* “Inland” quarters.

*Énú Ọnịcha* was beyond
the artillery reach of the Nigerian Army
and was, therefore, safer.
*Énú Ọnịcha* was farthest
from the west bank of the River Niger
at Asaba.
That west bank at Asaba
was where the rockets
of the Nigerian Army,
that were under the guidance
of Colonel **Murtala Mohammed,**
the future president of Nigeria,
were fired with reckless abandon.
And fired upon the Fegge
and Odoakpu Quarters
of downtown Onitsha.
During those eight days,
that followed October 4, 1967,
of continuous shelling,
the Biafran Army didn't evacuate
the 15,000 refugees
who sought shelter in *Énú Ọnịcha*
that was the Inland Town quarter
of Onitsha.

The Biafran Army used
those 15,000 refugees
as their human shields and their protection
against the steadily advancing
Nigerian Army
that out-manned and outgunned them
by four to one.
Throughout that 30-month-long war,
in which one in fifteen Biafrans died,
the Nigerian Army
controlled the Biafran airspace.
And enforced a complete sea blockade
of Biafra.

After the war was over,
I started nursing the ambition
to come to the USA.
I began supercomputing
on June 20, 1974, in Corvallis, Oregon.

# INVENTING THE WORLD'S FASTEST COMPUTER HOW ARE SUPERCOMPUTERS USED IN VENEZUELA?

In an email, a fifteen-year-old
writing the biography
of a famous computer scientist
and his contributions
to the development of the computer
asked me: "How are supercomputers
used in Venezuela?"

The supercomputer market
is valued at
forty-five billion dollars a year.
The energy and geoscience industries

buy one in ten supercomputers,
and use them to pinpoint oil deposits.

The Bolivar Coastal Oil Field of **Venezuela**
contains 32 billion barrels
of recoverable oil reserves.
The Bolivar Coastal Oil Field
stretches **across** thirty-five miles
along the coast of Lake Maracaibo
of **Venezuela**.
Fastest computing that's executed **across** millions of processors
is the key technology that must be used
to pinpoint deposits of crude oil
in the Bolivar Coastal Oil Field.
In 1989, I was in the news
for discovering how
the slowest processors in the world
could be harnessed
as the world's fastest computer.
And used to discover and recover
otherwise elusive crude oil
and natural gas.

Inventing the World's Fastest Computer On June 20,

**1974**, in Corvallis, Oregon,

I began programming

one of the most powerful supercomputers

in the world.

That was when I began my quest

for the fastest computation ever

that could be harnessed

and used to solve

the most difficult problems

in mathematics and physics.

As I grew in my knowledge,

I wanted to invent

my fastest supercomputing

as a new Internet

that's a new global network

of 65,536 processors

which, collectively, is sixty-four binary thousand times faster

than the fastest computer

that's sequentially processing

with one processor.

I discovered the fastest supercomputer
not as a computer, in and of itself,
but as a virtual supercomputer that's defined **across** a globe
which hosts a new global network
of processors that shared nothing,
but were in dialogue with each other.
I recorded the fastest speeds in computing
without the supercomputer,
as it was then known.

I visualized my new Internet
in the 16th dimensional hyperspace.
And I visualized that globe to be encircled by tw**o-raised**-to-power sixteen,
or 65,536, processors
with each processor akin to
a tiny computer.

I visualized those tiny computers to be uniformly distributed **across**
that globe, or separated equal distances apart.

I could discover but not create the fastest computation **across**
my new Internet. I can only discover a faster computation
if and only if that computation preexists **across** my new Internet.

And I can only invent techniques and technologies that can be invented,
or that the laws of physics
allow me to invent.
The fastest computer,
that yielded a quantum increase in speed, led to the creation
of the field of computational physics.
The fastest computing across
the slowest processors,
that I discovered
on the Fourth of July 1989,
gave birth to extreme-scaled,
high-resolution computational physics.
That discovery
of the world's fastest computing
is my contribution to physics.

I'm well-known,
but I'm not known well.

A teacher asked her students:

"Why is **Philip Emeagwali** famous?"

I'm well-known because
I knew a new arithmetic

that no teacher knew.

Before my discovery

of that new arithmetic which occurred

on the Fourth of July 1989,

teachers could only teach

how to perform

the fastest multiplications and divisions.

And how to execute them

on a computer

that was powered by one processor.

After my discovery of parallel processing,

teachers could now teach

how to solve the most difficult problems

in mathematics.

And solve them at the world's fastest speeds and **across**

the Philip Emeagwali Computer

that's not a computer, in and of itself,

but that's a new Internet, in reality.

Each discovery, or invention, we make contributes to human civilization.

Our technological quest

for the fastest computations **across**

a new Internet is our search for human progress.

## Turning Science Fiction to Nonfiction

To invent a new
computer
is to turn science fiction
to reality.
A science-fiction writer
can be a storyteller who solved
the most difficult problem
in mathematics.
And solved it
by merely waving his pen
and declaring the **impossible-to-solve**
is now **possible-to-solve**.
In contrast, a computational mathematician
can't solve the toughest
initial-boundary value problems
at the frontiers of calculus,
compute-intensive algebra,
or extreme-scale
computational fluid dynamics.
And solve such physics problems
by merely waving his, or her, hand.

As a high-performance
computational mathematician,
I can only discover the discrete solution
to the toughest problem
beyond the frontier of calculus.
And only discover that solution
if and only if such a solution exists
but was not understood.
I can only invent things
which are possible to invent.
A science-fiction writer
can write about cars
that run only on water
but which are **not** possible to invent.
In contrast, a scientist
must develop a prototype
of at least one car that he claims
only runs on water.
**It's possible** for a science-fiction writer
to write one hundred science-fiction books.
In contrast, it's **impossible**

for a supercomputer scientist

to make two ground-breaking discoveries

in his lifetime.

**It's impossible** for one inventor

to invent the world's fastest computer

that computes in parallel

and then later invent

the hoped-for quantum supercomputer

which wrangles subatomic particles

to encode information

as quantum bits, or qubits,

that exist in superposition.

The inventions of parallel

and quantum supercomputers

demands radical ideas, billions of dollars,

and decades of hard work.

The parallel and quantum supercomputers

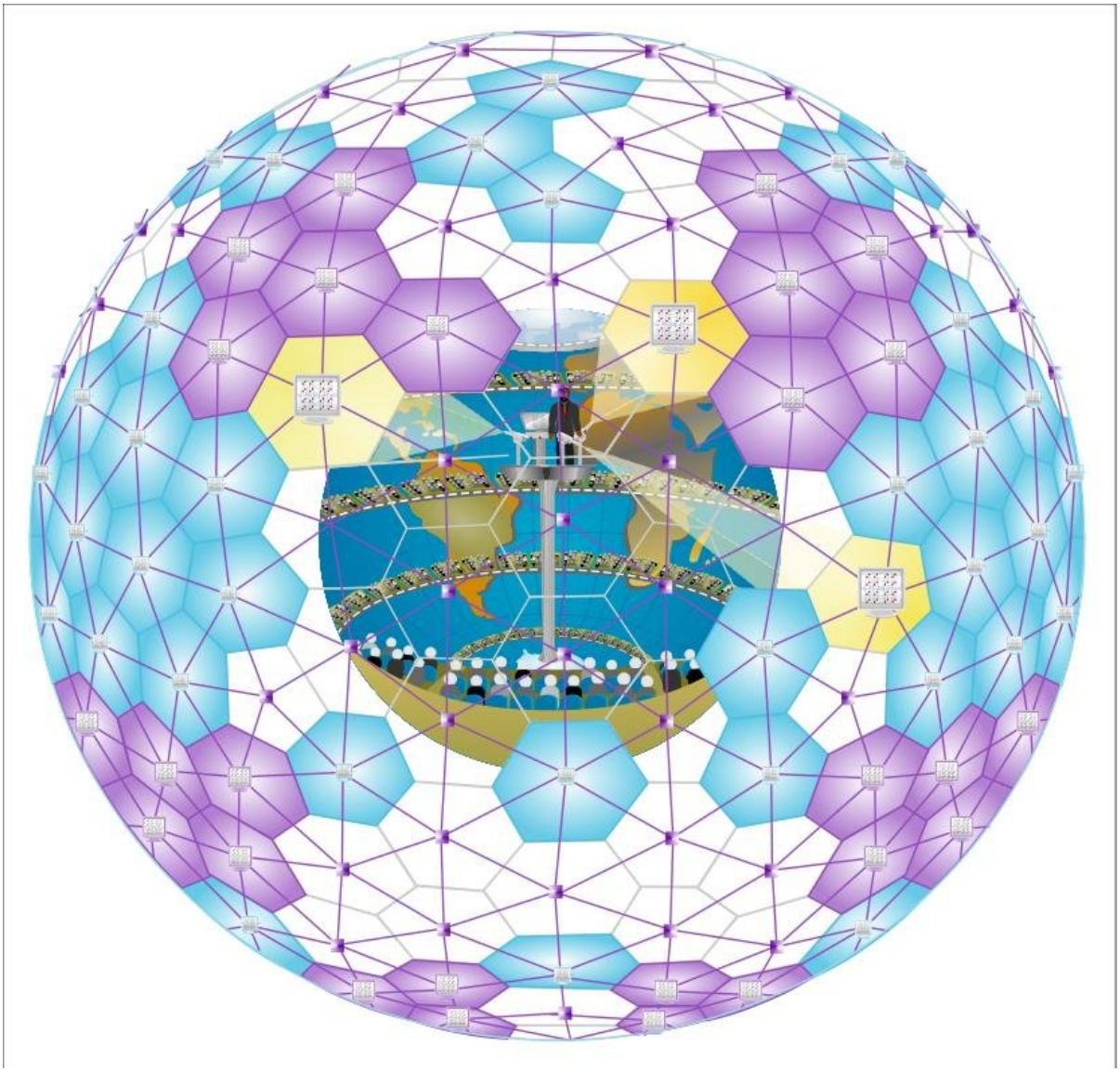
are each paradigm shifting.

And each technology changed the way

we look at the computer of tomorrow.

Nature does not give up its secrets
without a fight.

What are my contributions
to the invention of the fastest computers?



**Blueprint of Philip Emeagwali Computer and Internet**

“What did Philip **Emeagwali** contribute
to the development of the computer?”

To parallel process
the most difficult problem in mathematics
is to solve many less challenging problems **at once**.
The technique of computing many things
**at once**
was known to the census board
that used thousands of
human computers to execute billions
of arithmetic computations.
My contribution to computer science
was my discovery that
the world’s fastest computer
could be powered by
sixty-four binary thousand processors.
Each processor was akin
to a tiny computer
that can be used to solve
many compute-intensive problems
and solve them **at once**.
In 1989, my discovery of fastest computing
made the news headlines.

And did so because it opened the door

to the use of up to **one billion** processors

to power the world's fastest computer.

**I visualized my new Internet**

as my new spherical island

of sixty-four binary thousand processors.

Or as a new global network

of as many tiny identical computers.

**I visualized that new Internet**

as tightly encircling my room-sized globe.

Not only that,

**I visualized my new Internet**

as two-**raised**-to-power sixteen,

or 65,536, processors

that were identical.

And that were uniformly distributed

around the surface of a globe. Likewise,

**I visualized** that hypersurface

in a sixteen-dimensional **hyperspace**.

M**y visualization**

**of my new Internet**

was new.

Therefore, the word "Internet"

wasn't in my vocabulary

in the mid-**1970**s.
I coined the term “HyperBall Computer”
to describe my new global network
of computers and processors
which I theorized.
That HyperBall Computer was renamed as
“Philip Emeagwali Computer.”

My theory which I physicalized
as the fastest computer
was my mental re-creation
of a new Internet as a new supercomputer
that was powered by a new global network
of 65,536 processors that shared nothing.

# FIRST WORLD'S FASTEST COMPUTING ACROSS AN INTERNET

How did I win the Nobel Prize of supercomputing, back in 1989?

In **1989**, The Computer Society
of the Institute of Electrical
and Electronics Engineers (or IEEE)
issued a press release that I had achieved
a technological breakthrough.
And did so by discovering
the world's fastest computing **across**
the world's slowest processors.
That IEEE press release
had an impact because
the Institute of Electrical and Electronics Engineers

was the world's largest technical society.
In the May **1990** issue
of the academic journal named "Software,"
The Computer Society of IEEE
described the economic benefits
of my scientific discovery
of fastest computing. And described it as: [quote]
"The amount of money at stake
is staggering. For example,
you can typically expect to recover
10 percent of a field's oil."

The Computer Society of IEEE continued.

"If you can improve your production schedule to get just 1 percent more oil,
you will increase your yield
by $400 million."
[end of quote]

That **1989** press release
issued by The Computer Society
that announced my
technological breakthrough
and scientific discovery

of the world's fastest computing
and the companion articles
published by The Computer Society
in IEEE publications
led to cover stories
in many trade publications.
And led to front-page stories
that were titled:

"African Supercomputer Genius
Wins Top U.S. Prize."

And that **1989** press release
issued by The Computer Society
led to stories on my contributions
to mathematics, physics,
and computer science.
I discovered that the fastest computer
can be built with the slowest processors.
I discovered
how and why using
a thousand processors
makes modern computers **faster.**
And makes the newest supercomputer
the **fastest**. On July 4, **1989**,

the U.S. Independence Day,

in Los Alamos, New Mexico,

I discovered

**the Philip Emeagwali formula**

**for the world's fastest computing**

**that later U.S. President**

**Bill Clinton will describe**

**in his White House speech**

**of August 26, 2000.**

Fastest Computing Across an Internet My

technological breakthrough

opened the door

to the world's fastest computer

that must be used to solve

the most difficult problems in mathematics.

And solve such problems

at the **fastest** speeds ever recorded.

**I visualized** my scientific discovery

of the world's fastest calculations

as **occurring** across a new Internet.

Likewise, **I visualized** my new Internet

as defined as a new global network

of 65,536 off-the-shelf processors

and standard parts.

Furthermore. I invented

how to use my new Internet

to send and receive emails.

And do both at the fastest bandwidths

ever recorded. I invented

how to parallel program my new Internet.

**I visualized** that new Internet

as a new global network of

**65,536**, or sixty-four binary thousand,

tiny identical computers.

I theorized how to harness

those processors.

And use them to communicate **across**

another new global network of

**1,048,576**, or one binary million,

regular and short email wires

that were equal distances **apart**.

Not only that, I mathematically

and experimentally invented

how to solve sixty-four binary thousand

initial-boundary value problems

that arise beyond the frontier of calculus

and computational physics.

I invented how to solve them **at once.**

And how to email and solve them **across**

a new global network

of sixty-four binary thousand processors

that define my new Internet.

And how to reduce

65,536 days, or 180 years,

of **time-to-solution** within one processor.

And reduce that computation time

to one day of **time-to-solution**

**across** my new Internet

that's a new global network of

65,536 off-the-shelf processors

that're identical

that shared nothing

and that's a supercomputer, *de facto*.

I’m the only father of the Internet
that invented an Internet.

## Why is Philip Emeagwali Famous?

A question asked in school essays is this:

“Why is Philip **Emeagwali** famous?”

Before my discovery,
that occurred on July 4, 1989,
it was believed to be impossible
to achieve the world’s fastest computing and do so across
the world’s slowest processors.
It made the news headlines
when I **discovered**
that the unimaginable-to-compute
is **possible-to-super-compute**.
However, understanding how I made the unimaginable possible
wasn’t what made the news headlines,
in 198**9**.
What made the news headlines
was that I did the then impossible, namely
I discovered how to turn a vague idea,
a mere theory, and a science fiction

that was published on
February 1, **1922** into reality.
That science fiction
was about 64,000 human computers
forecasting the weather
around the globe.
On the Fourth of July **1989**,
I discovered
how sixty-four binary thousand processors that were evenly
distributed around a globe
can be used
to execute a global climate model.
Such high-stake climate models are used
to foresee otherwise unforeseeable
global warming.
I discovered
how to turn that science fiction of **1922**
to the nonfiction of **1989**
that's now known as
the world's fastest computing.
In the traditional way
of manufacturing supercomputers,
one powerful processor
is connected to one memory.

That super-fast processor

executes one instruction **at a time**.

## What is Philip Emeagwali Best Known For?

In my alternative way of inventing supercomputers,

I made the news headlines

when I discovered that parallel processing

is up to a billion times faster.

I discovered the world's fastest computing

on the Fourth of July 1989.

I discovered supercomputing

as it's executed today,

or how to compute at the fastest speeds,

and do so **across** my ensemble of the

sixty-four binary thousand slowest processors in the world.

I discovered the world's fastest computing

on July 4, 1989.

I discovered parallel processing by dividing

a compute-intensive, discrete,

and algebraic approximation

of an initial-boundary value problem

of calculus and physics, ranging from

a global climate model

to modeling the social distancing
that reduces the spread
of the coronavirus disease
within Nigerian buses
that pack passengers like sardines.
I chopped up
each compute-intensive problem
into lesser challenging problems.
Finally, I assigned one processor
to solve one less compute-intensive mathematical physics
problem.
Furthermore, I discovered
the **one-problem-to-one-processor** correspondence
which I used to solve
the sixty-four binary thousand
mathematical problems that, in totality,
are important societal problems.
The list of twenty most compute-intensive,
or grand challenge, problems includes,
detailed climate modeling
that must be executed
with the fastest speed and accuracy.
I discovered how to harness
my sixty-four binary thousand processors

which I used to, *de facto*,
synchronously solve
my two-**raised**-to-power sixteen
initial-boundary value problems
that I solved **at once**.
My invention of how to execute
the fastest computing
can be extended to a billion processors
which encircle an Internet, or a globe.
And did so as one seamless, coherent,
and gigantic supercomputer.

## What is Philip Emeagwali Famous For?

In 1989, it made the news headlines
that a Nigerian supercomputer genius
in the USA had recorded
the fastest speed
in the history of computing.
And recorded that speed **across**
the slowest processors in the world.
And recorded that speed while solving
the most compute-intensive problems
in the world.

I’m that Nigerian supercomputer scientist
that was in the news.

On the Fourth of July **1989**, I recorded
the highest speedup and the fastest speed
in supercomputing.
That scientific discovery
led to my conclusion
that fastest computing across
a billion processors
will become the technology
that can yield
a factor of one-billion-fold reduction
in the wall-clock times
for solving the most difficult problems
in mathematics and physics.

That includes global climate models
used to foresee
otherwise unforeseeable long-term global warming.
The most powerful supercomputers
are used to address
some of the world’s biggest challenges.

# 4TH LECTURE: INVENTING THE FIRST SUPERCOMPUTER THAT'S THE FIRST INTERNET

**Broadcast 29 August 2021**

**https://youtu.be/Yc3Mbl1l8Tk**

WORLD’S FASTEST
COMPUTER I’M A NIGERIAN-
BORN COMPUTER SCIENTIST
WHO CAME OF AGE IN THE USA
OF THE 1970S AND 80S.
IN THE 1980S,
THE MOST COMPELLING
MATHEMATICAL PUZZLES AND
QUESTIONS
THAT FACED HIGH-
PERFORMANCE
COMPUTER SCIENTISTS WERE

# THESE: “WHAT’S THE SPEED LIMIT IN COMPUTING?

“Or what’s the best way
to build the world’s fastest computer?”

“Can the world’s fastest computer
ever fit in a room?”

“Can the most difficult problems
in mathematics
be solved across
an ensemble of one billion processors
that outline an Internet?”

“How do we invent
a never-before-seen computer?”

“Can a billion processors work together
to emulate a supercomputer?

It’s easier to ask these questions
than to provide their answers.
But the world worships any inventor
who can answer the most difficult questions
at the crossroad

where new computational mathematics, new computational physics,
and fastest computing intersect.

A school essay question **is this**:

"What is the contribution
of Philip **Emeagwali**
to the development of the computer?"

I discovered
the world's fastest computing **across**
the world's slowest processors.
And discovered
how to use the fastest computers
to solve the most difficult problems
in mathematics.
I made those discoveries
on the Fourth of July 1989.
My new computer science
**opened the door**
to the world's fastest computer
that now occupies the footprint
of a football field.
The fastest computer

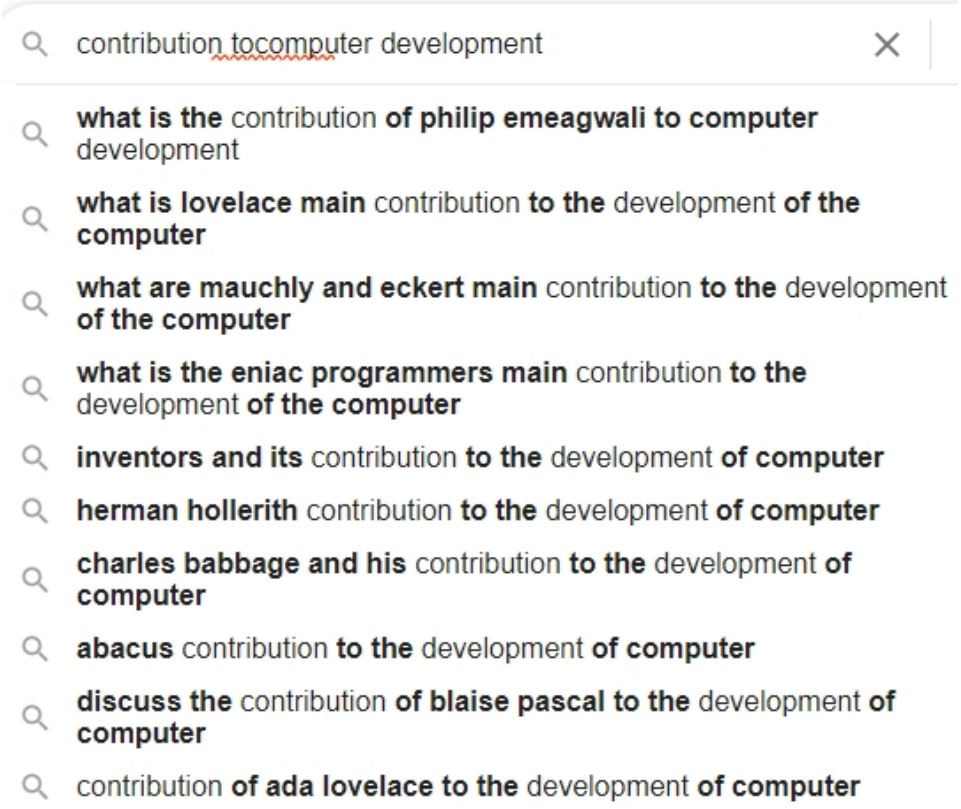
is powered by millions of processors.
Before my supercomputing discovery,
the idea of the fastest computing **across** the slowest processors
was merely a theory,
or an idea that's not positively true.

My contribution to the development
of the world's fastest computers **is this**:

I discovered that
a billion self-contained processors
that were locked together
can be programmed to emulate
one seamless, coherent machinery
that's a supercomputer, in reality.
My discovery is the origin
of the first supercomputer.

Becoming a famous computer scientist doesn't happen the way you see them
in the movies.
I began supercomputing
on June 20, 1974, in Corvallis, Oregon, USA. Back in 1974, I was not hailed
as a supercomputer genius.

The reason was that the world
waited for fifteen years
for me to provide the hard evidence
that the world’s slowest processors
can power the world’s fastest computer.
At 8:15 in the morning, on July 4, 1989,
I discovered that
using a billion processors
to power a supercomputer
is useful and doable.




Google suggests the greatest computer scientists of all times. With the number one spot, Philip Emeagwali is the most suggested computer pioneer for school biography reports across the USA, Canada, UK, and Africa (December 8, 2021).

# How My Discovery Killed the Vector Supercomputer

## School essays on the contributions

## of **Philip Emeagwali**

## to computer science

highlight the invention

of how to harness the slowest processors

to perform the fastest computing.

That invention is **central**

to the first supercomputer,

as it's known today

and as it's expected to be known tomorrow.

The reason my invention

made the news headlines, in 1989,

was because it heralded the end of the era

of vector supercomputers

that was powered by only

one isolated vector processing unit.

Inventing the world's fastest computer
demands programming
millions of processors,
not interacting with thousands of people.
As a Black supercomputer inventor
in the USA of the 1970s and 80s,
I discovered the world's fastest computing and did so alone,
as well as independently of any institution.

# A Black Inventor in All-White Spaces

**Breaking Stereotypes of Black Men In the 1970s and 80s, I was a Black inventor that was trapped within all-white spaces.**

**In the 1970s and in the USA,**
**the most brilliant sub-Saharan**
**African scientists**
**were not allowed to teach, research,**
**and even present their inventions**
**to the public.**
**And compete on the same terms**
**as white scientists.**
**I was the first person**
**to perform the world's fastest computing**
**and do so via parallel processing.**
**Because I was Black, I was not allowed**
**to teach, research, and even present**
**my world's fastest computing**
**to the public.**

In a perverse twist,
as computers become faster,
the more reliant on parallel computing
they become.

And parallel computing became synonymous with computer science.

Parallel computing is ubiquitous
at the frontier of knowledge
of the most difficult problems that arise
in science, engineering, and medicine.

In the early **1980**s,
my world's fastest computing
was rejected
when I first presented the technology
to universities in the USA.

In the mid-**1980**s,
my theorized fastest computing **across**
a new global network of 65,536 processors was rejected in Ann Arbor.

It was rejected because
a Black inventor invented it.

In 1989, and after I won
the highest award in supercomputing,
I received invitations to give lectures
on the world's fastest computer.

And to give those lectures at a time
I was the only person in the world
that could deliver such lectures.

It should not come as a surprise that
on YouTube,
I delivered the most lectures
on contributions to mathematics, physics,
and computer science.
What surprised me, in 1989,
was that I was often disinvited
from giving lectures
on the world's fastest computing,
even though I was the first
supercomputer scientist
that came to mind
when thinking about how to solve
the most difficult problems in mathematics.
And solve them on the fastest computer
that's powered by millions of processors.
The disparate treatment was this:

A white computer scientist
who could only teach
the old sequential computing paradigm
was hired over
the Black supercomputer scientist

who discovered
the new paradigm of supercomputing **across** a billion processors.

Because of the institutionalized
racial discrimination in the USA,
I became well-known,
but not known well.

Racism is a dangerous cancer of the mind.

Not allowing the Black mathematician
to solve the most difficult problems
in mathematics
slows down human progress.
And does so by excluding geniuses
from contributing to knowledge.
The irony was that
those white supremacists
who disinvited me from giving
research lectures on my contributions
to developing the fastest computers
now complain that
they couldn't understand
the complicated mathematics
and the advanced computer science

that were behind the invention
that I made in the 1970s and 80s.
I described my inventions **across**
the one thousand closed-captioned videos
that I posted on my YouTube channel, named "**Emeagwali**."
I've been supercomputing
since June 20, 1974,
in Corvallis, Oregon, USA.
After half a century of supercomputing,
a huge knowledge gap developed
between those that rejected
my new computer science
and myself.
That knowledge gap manifested itself
in their inability to replicate
my world's fastest computer speeds
of July 4, 1989, in Los Alamos, New Mexico, USA.
That knowledge gap is visible
after watching
the one thousand closed-captioned videos of my lectures
which I shared on YouTube.
And then comparing them
to the videotaped lectures
of the leading minds in mathematics, physics, and computer

science.

The misperception of white supremacists

that **Albert Einstein**—who is considered the father of modern physics—

knows more about computational physics

than I do

differed from the reality

that I was the only single person

to ever record

the world's fastest computation.

On YouTube, I said much,

in a thousand videos,

about the first supercomputer,

as it's known today.

And I did so because

I was the first inventor to understand that the new computer becomes

the world's fastest, if and only if,

it's powered by up to

one billion processors.

## My Breakthrough That Changed the Way We Look at Computers

In the old way of solving

the most difficult problems in mathematics,

the fastest computation was achieved

by solving one

initial-boundary value problem

of physics.

Such mathematical problems arise

in multi-scale modeling

of biological systems

as well as the large-scale

computational fluid dynamics model

that must be used to foresee

how the coronavirus disease

spreads **across**

the densely-packed Onitsha market,

where social distancing is not enforced.

In the old mathematics textbooks,

only one such problem was solved

**at a time** and within one processor.

In 1989, I was in the news because

I discovered a new

billion-processor paradigm

that was a faster way

of solving the most difficult problems

in mathematics.

My new mathematics yields

the first world's fastest computing across

the world's slowest processors.

In my new supercomputing paradigm,

I changed the way I looked at

the world's fastest computer.

I discovered how to perform

the world's fastest computations

And solve

the most compute-intensive

mathematical problems

in computational physics.

And I invented how to solve them **across**

an ensemble of

a billion coupled processors

that shared nothing.

And solve them millions of times **faster**

than in the conventional paradigm

of solving

one problem **at a time**.

I achieved that mathematical breakthrough

of solving 65,536

initial-boundary value problems

each governed by a system

of partial **differential** equations.

And solving them **at once**

and **across** as many processors

that were evenly distributed **across**

a globe.

The initial-boundary value problem

that's governed by a system of

partial **differential** equations

is the most useful subject in mathematics. But to be useful,

these grand challenge problems

must be solved **across** an ensemble

of up to one billion processors.

I was the first person to discover

how to solve partial **differential** equations

**and do so across**

up to one billion processors.

And solve them

at the world's fastest computing speeds.

That paradigm shift

in high-performance computing,

or change in the way

we look at the world's fastest computer,

went against the prevailing dogma.

Prior to my supercomputer discovery

that occurred on July 4, 1989,

computer scientists believed that

it will be **fastest**

to solve only one compute-intensive problem **at a time**, instead

of solving

up to one billion problems **at once**.

That supercomputing dogma

of solving one problem **at a time**

and solving it on one powerful processor

was encoded in Amdahl's Law.

## A New Supercomputer Creates New Sciences

Physics

is the king of sciences.

And mathematics is the queen of sciences. Computer science is

not a science,

in and of itself.

Computer science is a science of sciences.

The invention

of the world's fastest computing

that works differently

from regular computers

creates new sciences.

In science, it was not enough

for me to say that a billion processors

could be used to solve

the most difficult problems in mathematics. I had to provide the

hard evidence

that my theory was true.

On July 4, 1989,

I experimentally proved my discovery

to be true.

Furthermore, I provided

the complete explanations

of how I made

my supercomputing discovery.

I did so **across** the one thousand videos

that I posted

in my YouTube channel named “**Emeagwali**.”

Amdahl’s Law was to the supercomputer

what Moore’s Law is to the computer.

And what the Second Law of Motion

is to physics.

Amdahl’s Law decreed that

a speed increase of a factor of eight

would be impossible to attain

**across** eight, or more, processors.

I was in the news because

I discovered that

supercomputer textbooks that quoted Amdahl’s Law were wrong.

I proved computer science textbooks wrong when I discovered

how to use my new global network

of the slowest 65,536 processors

in the world

to execute the fastest computer calculations.

And solve the

most difficult problems that arise

in mathematics, science, and medicine.

The poster girl of difficult problems

in mathematics

was extreme-scale
computational fluid dynamics,
such as high-stake
petroleum reservoir simulations
that must be used to nail down
the exact locations of crude oil
and natural gas
that are buried up to 7.7 miles
(or 12.4 kilometers) deep.
And buried **across** an oil producing field
that's the size of a town.
I used my 65,536 processors
to perform the arithmetic operations
from the system of equations
of computational linear algebra
from
my finite difference discretizations
of a system of
partial **differential** equations
beyond the frontier of calculus.
I invented
nine partial **differential** equations,
called the **Philip Emeagwali** equations.
And I invented them by encoding

the Second Law of Motion
described in physics textbooks
into them.
The **Philip Emeagwali** equations
govern the motions of crude oil
and natural gas
that flow across a highly anisotropic
and heterogeneous producing oil field
that's up to twice the size of the state of
Anambra, Nigeria.
Amdahl's Law claims that
an ensemble
of a billion processors
couldn't be harnessed.
And used to solve
initial-boundary value problems
of computational fluid dynamics.
And solve them with the hoped-for
speed increase of a factor of one billion.
I discovered that Amdahl's Law
was a false theory, and an enormous lie,
that was spread around
via computer science textbooks.

By its definition,

a theory is not positively true.

## Solving the Nine Philip Emeagwali Equations

In the 1980s,

I was the only full-time programmer

of the most massively

parallel supercomputer ever built.

I discovered how to compute

at the fastest speeds.

And compute while solving

the toughest mathematical problems.

And compute **across** a new Internet.

I visualized my new Internet

as a new global network

of 65,536 off-the-shelf processors

and standard parts.

Those processors were identical,

coupled, and equal distances **apart**.

So, I was the first person

to understand the new supercomputing

as fastest computing **across**
a million processors.

I'm not a science teacher
of known facts in textbooks.
The one thousand closed-captioned videos
that I shared on **YouTube**
were my first-person accounts
from the unexplored territories
of knowledge.

My lectures were stories about
new partial **differential** equations,
called the nine
Philip **Emeagwali** equations
beyond the frontier of calculus.
Until I discovered them, those equations
had not been written
in any calculus textbook.

My invention was how
the world's fastest computer
can be built
from the world's slowest processors.
My discovery which occurred
on July 4, 1989,

made the news headlines because
it was new knowledge
that changed the way
mathematicians solve
their most difficult problems.
Until my discovery,
the fastest computer speed
had not been recorded
by a one-person team.
Or recorded **across**
the slowest processors in the world.
So, my lectures **across**
the one thousand podcasts
and closed-captioned videos
which I posted on YouTube
were first-person stories
from the frontiers of supercomputing.

Philip Emeagwali YouTube Lectures My lectures were
first drafts
of the history of supercomputing
and computational mathematics.
I understood that new supercomputer

as a radical shift that will change the way

we look at the modern computer.

That was the reason my discovery

of fastest computing

made the news headlines.

That headline was that

a lone African supercomputer genius,

in the USA,

had won the highest award

in supercomputing.

And won it for discovering

how to harness

the sixty-four binary thousand

slowest processors in the world

and for discovering

how to use those processors

to solve the most difficult problems

arising in mathematics and physics.

And solve them

at the fastest speeds in computing.

Because I was the first person

to make that supercomputing discovery

my name, **Philip Emeagwali**,

comes up first in **YouTube**

and for search terms like: “contributions to mathematics, physics,

and computer science.”

My contributions to mathematics

**were these**:

I invented the system of

nine Philip **Emeagwali** equations,

each a partial **differential** equation.

My system of equations

is a new mathematical tool

used to pinpoint the locations

crude oil, injected water,

and natural gas

that flow up to 7.7 miles

underneath the Earth.

And I invented

how to solve the corresponding

initial-boundary value problem.

And solve it **across**

up to a billion processors
that outline and define an Internet.

My new mathematical knowledge
expanded the ever-growing
body of knowledge
that's known as calculus.
It's an absurd **over**simplification
to claim that calculus
was co-invented, 330 years ago,
by Isaac Newton
and **Gott**fried **Wil**helm von **Lei**bniz.
This claim is erroneously repeated
in calculus textbooks and by its teachers.
Newton and Leibniz contributed to calculus
but did not invent the subject.
The development of calculus
is the product
of centuries-long evolution.
Recent contributions to calculus
include the nine
partial **differential** equations
that I invented and my discovery
that initial-boundary value problems

governed by a system
of partial **differential** equations
can be solved **across** an Internet
that's a global network
of up to a billion processors.
My contribution to mathematics
was in the top mathematics publications
in the world, including being mentioned
in the July 1990 issue
of the "Notices
of the American Mathematical Society."

A NEW COMPUTER THAT'S A
NEW INTERNET IN 1989, I
DISCOVERED HOW TO SOLVE
THE MOST DIFFICULT
PROBLEMS
IN MATHEMATICS AND PHYSICS.
I MADE MY DISCOVERY
ON A NEW SUPERCOMPUTER
THAT'S POWERED BY
A GLOBAL NETWORK OF UP TO
ONE BILLION PROCESSORS.
MY PROCESSORS OUTLINE AND
DEFINE

MY NEW INTERNET.

THE NEW KNOWLEDGE THAT I

CONTRIBUTED

TO MODERN SCIENCE AND

TECHNOLOGY

INCLUDE NINE

PARTIAL DIFFERENTIAL

EQUATIONS.

THE PHILIP EMEAGWALI

EQUATIONS

WERE MY CONTRIBUTIONS

TO THE EXISTING BODY OF

MATHEMATICAL KNOWLEDGE.

I WAS A RESEARCH PHYSICIST

WHO CAME OF AGE IN THE 1970S

AND 80S

AND FIRST WON ACCLAIM IN

1989.

I DISCOVERED

HOW TO USE THE LAWS OF

PHYSICS

TO GAIN A DEEPER AND SURER

MATHEMATICAL

UNDERSTANDING

OF HOW TO MODEL

MULTIPHASE FLOWS

OF CRUDE OIL, INJECTED

WATER,

AND NATURAL GAS

THAT WERE FLOWING UP TO 7.7

MILES DEEP

AND INSIDE A PRODUCTION OIL

FIELD

THAT'S THE SIZE OF A TOWN.

FURTHERMORE, I WAS AN

INVENTOR

WHO INVENTED A NEW

SUPERCOMPUTER

THAT'S A NEW INTERNET.

NOT ONLY THAT, I FORCED

THOSE THREE IDENTITIES

TO MERGE WITHIN ME

AND FIND A COMMON

BUT NEVER-BEFORE-SEEN

TECHNOLOGY.

I VISUALIZED MY INVENTION

AS A HIGH-PERFORMANCE

COMMUNICATING

AND COMPUTING MACHINERY.

AND AS A NEW

SUPERCOMPUTER

THAT’S NOT A NEW COMPUTER,

BY AND IN ITSELF,

BUT THAT’S A NEW INTERNET,

BY DEFINITION.

I was treated differently

after my discovery

of the first supercomputing

**across** the world's slowest computers.

My invention occurred in Los Alamos,

New Mexico, USA.

And it occurred on the Fourth of July 1989.

After the news headlines

that followed that invention

the stories chased me,

rather than me chasing the stories.

And the hummingbirds

flew towards me,

rather than me running towards

the hummingbirds.

Breaking Racial Barriers at the Frontiers of Science I

began supercomputing

on June 20, 1974,

in Corvallis, Oregon, USA.

In 1974, few Blacks were allowed entry

into supercomputer learning

and research centers.

Twelve years earlier, a Black student,
James Meredith, fought to integrate
the University of Mississippi.
Without access to education,
the likes of James Meredith
cannot become supercomputer scientists.
That was why I never met
a Black supercomputer scientist,
during the 1970s and 80s.
And that was why everyone was shocked
when a Black person
won the highest award
that computer scientists describe as
the Nobel Prize of Supercomputing.
I won that prize alone back in 1989.

My discovery of the world's
fastest computing
was a record-breaking
and sustained performance.
It was recorded in the June 20, 1990, issue
of *The Wall Street Journal*.
I was in the news
on the day **Nelson Mandela**

was released from prison.
But I was boycotted
in the manner South Africa was boycotted for apartheid.
That boycott was significant because
in schools the bearer of new knowledge,
or scientific discoveries, transmits it
through the spoken word.
A scholar without lectures
on **YouTube**
is like radio without sound,
or a movie without images.

Those early boycotts
of my lectures of the **1980**s
were the scientific equivalent
of mainstream radio stations
working together
to keep Black music off the air.

In the field of supercomputing of the 1980s,
most of the 25,000 paid positions
were reserved for white males.
I gave hiring lectures
for some of those paid positions.

After each hiring lecture,
the supercomputing position was closed.

When it comes to racial diversity
in American academia, the fields of
mathematics, physics,
and computer science
are half a century behind society others.
The racial diversity
in the supercomputing world
of the **1970**s and **80**s—the two decades during which I came of age—
was like the racial diversity
in U.S. mainstream radio broadcasting
of the **1920**s and **30**s.
In the **1940**s and **50**s,
African-American entertainers
were forced to use a different door
to enter white radio stations.
In the **1970**s and **80**s,
my accesses to supercomputers
were withdrawn after it was discovered
that I was Black and sub-Saharan African.

A school essay question **is this**:

## “Who is the father of supercomputing?”

Asking who is the father of supercomputing
is like asking
who is the father of rock ‘n’ roll.
No one person started rock 'n' roll.
Notwithstanding, if two persons
can claim the title of the
Father of Rock ‘n’ Roll,
they will be **Little Richard**
and **Chuck Berry**.
**Elvis Presley** will not be included because
he didn’t write his songs.
**Elvis Presley** brought rock ‘n’ roll
to a larger audience
and became the face of white rock ‘n’ roll.
Unlike **Elvis Presley**,
the songs of **Little Richard**
weren’t played
on mainstream radio stations.
Instead, the covers of **Little Richard**’s songs
that were recorded by **Pat Boone**
and **The Beatles**—were played on
white radio stations.

And those covers became hit songs.
Fast-forward three decades from the **1950**s,
I discovered that
white scientific communities
weren't ready to hear my new presentations
on fastest computing,
just as mainstream radio stations
didn't play Black music.
And white research scientists
were paid millions of dollars
to falsely claim the credit for inventing
the Philip **Emeagwali** Computer,
which I invented half a century ago.

My Early Years in Supercomputing When I began
supercomputing
on June 20, **1974**,
in Corvallis, Oregon, USA, dividing
the most compute-intensive problems
from large-scale
geophysical fluid dynamics
and dividing such difficult problems
into a billion lesser challenging problems

and then solving those smaller problems **across**

an ensemble

of one billion processors

was science fiction.

For those reasons, large-scale

computational physicists

and mathematicians

were frightened and fled from

computing across processors.

The June 14, 1976, issue

of the *Computer World* magazine

summed the difficulty up in an article that was titled: quote

“Research in Parallel Processing

Questioned

as a ‘Waste of Time.’”

unquote Earliest Rejections of My Discovery of Parallel

Supercomputing Vector supercomputer scientists fled

from parallel computing

because they believed

it would be simply impossible

to harness thousands of processors.

And use them to solve

the most difficult problems

at the frontiers of knowledge

where new mathematics, new physics,

and new computer science intersect.

I was castigated, ostracized, and banished

during my fifteen-year-long quest

for the world's fastest computer.

That quote, unquote "new computer"

wasn't a computer, in and of itself.

It was a new Internet, in reality.

I discovered my new Internet

and new supercomputer within the bowels

of an ensemble

of the 65,536 slowest processors

in the world.

At its core, I defined my

world's fastest computing

as occurring when one billion processors

work together

as one seamless, coherent unit

that can be used

to solve as many problems **at once**.

Such less-challenging problems

arise from

dividing up the most difficult problem

in mathematics

into one billion less difficult problems

that are mapped

with a one-problem to one-processor correspondence.

Each processor operated

its operating system

and had its dedicated memory.

In contrast and in symmetric multiprocessing, several processors

share a single memory.

And share the same operating system.

As a supercomputer scientist,

I came of age in scalar supercomputing

of mid-**1974** in Corvallis, Oregon, USA.

And in the first supercomputing

**across** the world's slowest computers

that I discovered on July 4, 1989,

in Los Alamos, New Mexico, USA.

In the 19**70**s, parallel computing

was mocked, ridiculed, and dismissed

as a tremendous waste of everybody's time.

It was then believed that

one billion processors

could only yield a maximum speed increase

of a factor of two.

And do so if and only if fifty (50) percent

of the compute-intensive problem

can be solved **at once**.

That parallel-processed speed increase

becomes a factor of four, ten, and twenty

and becomes so

when seventy-five (75) percent,

ninety (90) percent, and ninety-five (95) percent, respectively, of

the large-scale

computational fluid dynamics code

could be solved **at once**.

The First Acceptance of My Discovery of the

World's Fastest Computing I was in the news, in 1989,

because I was the computational mathematician

who discovered

how to unlock Moore's Law

for one processor.

And discovered

how to mathematically solve

one billion difficult problems

**at once.**

And solve them **across**

an ensemble

of one billion processors.

A question in school essays **is this**:

"What is the contribution of

Philip **Emeagwali** to mathematics?"

The first world's fastest computing across

up to one billion processors

that work together to solve

the most difficult problems

is my contribution to mathematics.

My new knowledge

must be used to address the biggest challenges

that are governed by

partial **differential** equations.

Such equations occur

at the frontiers of calculus, algebra,

and physics.

For example, a system of coupled, nonlinear

partial **differential** equations

must be solved

to deeply understand

the spread of the coronavirus disease **across** the crowded Onitsha

market

of my country of birth, **Nigeria**.

That's my contribution

to large-scale computational mathematics.

The modern calculus will not be useful

without the supercomputer,

or without solving

the most compute-intensive problems in calculus

and solving them **across**

an ensemble

of millions of processors.

The technique of parallel computing

was to a large extent

invented by computational mathematicians

for computational physicists.
After my discovery
that the world's fastest computers
can be built from standard parts,
called processors, parallel supercomputing
made the vector supercomputer obsolete.
And reduced it
to the technological equivalent
of the **horse** and **carriage**,
that was replaced by
the now obsolete **steam engine**.

**I discovered the fastest computing from the slowest processing The obstacle that I overcame**
**before I could discover**
**the first world's fastest computing across**
**the world's slowest processors**
**was to become the first person to figure out**
**how to use the slowest processors**
**in the world.**
**And use them to solve**
**the most compute-intensive problems**
**in the world.**
**Those were the most difficult**
**mathematical problems**

**that must be solved across**

**the millions of processors**

**that outline and define**

**the extremely fast supercomputer.**

**And solve them**

**at the fastest possible speeds**

**in the world.**

**In the supercomputer textbooks**

**of the 1980s,**

**that obstacle was described as**

**overcoming the bottleneck**

**called Amdahl's Law.**

**In prose, Amdahl's Law decreed that**

**when capital "P" number of processors**

**is used to solve a compute-intensive**

**initial-boundary value problem of calculus,**

**such as those in large-scale**

**computational fluid dynamics,**

**and if the serial fraction**

**of that Grand Challenge Problem**

**is lower case "f,"**

**then the expected increase in supercomputer speed will be**

**one divided by the sum of**

**lower case "f"**

**plus one minus lower case “f”**

**divided by capital “P.”**

The expected increase

in parallel-processed speed **across**

one billion processors

will only be as large as

the weakest link will permit.

# HOW I RECORDED UNRECORDED SUPERCOMPUTER SPEEDS

Naming Emeagwali Supercomputer Computer
scientists often ask
how did I uniquely name
my 65,536 processors
that I harnessed to execute
the world's fastest computing of 1989.
Because I invented new supercomputing,
I had to come up with a new name for it,
and do so for the same reason
a new-born infant
must have a new name.
At various times in the 1980s,
I named it a HyperBall supercomputer.
Then I shortened that name

to a hyper-computer.

It was finally renamed

the quote, unquote

“Philip Emeagwali Supercomputer.”

The **Emeagwali** Computer

is a new global network of

millions of processors,

or a small and physically realizable

copy of the Internet

that’s not a science fiction.

Such idealized Internets

might not be visible around a globe

but will be intelligible

to the supercomputer scientist.

Parallel Supercomputing is My Contribution to

Science Why the Computer Was Invented If necessity is the

mother of invention,

I say the most compute-intensive problems

in science, engineering,

and medicine necessitated

the pushing of the frontiers of

the fastest computers.

The supercomputer was invented

out of necessity.

And invented by mathematicians

for mathematicians.

The partial **differential** equation

of the mathematical physicist

is the most recurring decimal

in fastest computing.

The quest to use an electronic machinery

to solve the **ordinary** differential equation

of calculus

that governs the trajectories of missiles

was the difficult problem

that motivated the invention

of the first programmable computer.

That computer was created, in 194**6,**

and at the Aberdeen Proving Ground,

that was twenty-six miles

outside Baltimore, Maryland,

the birthplace of my wife, **Dale**.

That all-vacuum tube supercomputer,

of 1946,

used 18,000 vacuum tubes.

# MY CONTRIBUTIONS TO PHYSICS

Notes from a Black Astronomer My quest was for
the fastest computer
that could be used to solve
the most difficult problems
in mathematics and physics. An example
of such grand challenge problems
include
the initial-boundary value problem
of calculus
that’s governed by a system of coupled, nonlinear, and
time-dependent
partial differential equations
that’s always at the
mathematical physics core
of any computational fluid dynamics code.
In particular and for everyday uses,

a system of
partial differential equations
is at the calculus, algebra,
and physics cores
of the general circulation model
that governs the motions
of the water and air
that enshroud the Earth.
Such partial differential equations
interest astrophysicists because
they also govern the motions
of the fluids that circulate around
distant planets and stars.
I invented Philip Emeagwali Computer
to be used to solve
the most compute-intensive problems
that arise as extreme-scale
computational fluid dynamics modeling.
A poster child
of such Grand Challenge Problems
is the general circulation model

within the Earth's concentric atmosphere
that's represented by the domain
of the arising
initial-boundary value problem.
Another poster child
of computational fluid dynamics
is the supercomputer modeling
of the limited air circulation
of contagious viruses.
In particular, the simulation of
a once-in-a-century global pandemic.
And how it spreads
inside the 2,400 train sets
of Spain's Madrid Metro system.
Each train packed passengers like sardines.

The reason I talked about distant planets,
stars, and galaxies
was that I was trained as an astronomer,
in the mid-**1970**s in Corvallis, Oregon, USA.
I received my earliest job offers
as an astronomer, rather than as

a computer scientist or mathematician
or physicist. The reason was that
the U.S. Office of Personnel Management
rated me higher as an astronomer.

## Supercomputing Astrophysical and Geophysical Fluid Dynamics

The movements of the eight planets,
around our sun,
obeys the laws of motion of physics.
The ebb and flow of the tides
of the **water** and **air**
that enshroud the Earth
obeys the Second Law of Motion
described in physics textbooks.
That Second Law of Motion
was discovered **330** years ago.
The Second Law of Motion
was discovered in prose.
But it was coded in algebra as **Force** equals **Mass** times
**Acceleration**, or **F=ma.**

My contributions to calculus **were these**:

I reformulated the iconic formula **F=ma**
into a system of nine coupled, nonlinear,
and time-dependent
partial **differential** equations
that governs subsurface motions
of multiphase flows **across**
a porous medium, such as the 65,000
oil fields around the world
that include the supergiant oil fields
in Venezuela, Ka**zak**hstan, and Russia.
My new system of nine equations
governs the flow of crude oil,
injected water, and natural gas
flowing **across** an oil producing field
that's up to 7.7 miles
(or 12.4 kilometers) deep
and often the size of Onitsha, **Nigeria**.

My contributions to algebra **were these**:

I discretized
those partial **differential** equations
beyond the frontier of calculus
into partial **difference** equations
beyond the frontier of large-scale algebra.

Furthermore, I reduced
my algebraic formulation
to computer codes.
In 1989, I was in the news because
I recorded the world's fastest computing.
I did so by executing
my 65,536 supercomputer codes **at once**
and **across**
and with a one-to-one correspondence
with my ensemble of 65,536 of processors.

At its physics core, calculus is about
changes and motions
that range from the geophysical motions
of the Earth's liquid outer core
that's very hot, very dense
to the astrophysical motions
of distant stars.

Supercomputing Planetary Fluid Dynamics My quest
was to theorize
my governing system of coupled, nonlinear,
and time-dependent
partial **differential** equations

that encoded

the fundamental laws of fluid dynamics.

I visualized

my computational fluid dynamics codes

not as executing within one processor

but as executing **across** my ensemble

of 65,536 processors.

I theorized each processor

as parallel to each of my 65,536

divided atmospheres

or as many blocks of oil fields.

Those individual atmospheres

completely and tightly enshrouded

my geometric metaphor

for the entire Earth's atmosphere.

My geometric model

was a concentric sphere

that was sixty-two [62] miles thick.

That model had an inner diameter

of seven thousand nine hundred

and eighteen [7,918] miles.

My quest was to discover

how I could harness and use

my sixty-five thousand five hundred and thirty-six [65,536]

equidistant processors

to solve the most difficult problems

in mathematics and physics.

Towards that end,

I visualized my processors

as braided together around a globe.

And used

to solve sixty-four binary thousand

equally compute-intensive problems.

And used to solve them

with a one-processor to one-problem

mapping and correspondence

that preserved nearest-neighbor proximities which, in turn,

was the mathematical precondition

to my recording

the world's fastest computing.

My Contributions to Physics In the early **1980**s,

my grand challenge was to invent

the techniques and technologies

to be used to solve

initial-boundary value problems.

And solve them with up to

one billion processors.

And with a speed increase of one billion.

My contribution

to the mathematical solution

of such compute-intensive

physics problems

was the cover story

of the flagship publications

of top mathematics societies,

including the May 1990 issue

of the *SIAM News*

that is published by

the Society for Industrial

and Applied Mathematics.

My record-breaking sustained performance in computing

was mentioned in the June 20, 1990, issue

of *The Wall Street Journal*.

My contribution to mathematics

was that I turned

that mathematical fiction

—of the fastest computing **across**

the slowest processors—

into a non-fiction.

That world's fastest computing

is the new knowledge that I discovered

that was used to **upgrade**

the parallel computer

to the stature of a supercomputer.

The world's fastest computer of today

became a nonfiction after my discovery

that occurred at fifteen minutes after 8 o'clock in the morning

of July 4, 1989, in Los Alamos, New Mexico, USA.

# PHOTO GALLERY


A ROSE

# WALKING INTO HISTORY

The Supercomputer of Incredible Power

**An ode to the supercomputer**
**(Exploring the Majesty of the Powerful Machine)**

Oh, supercomputer, you are a marvel to behold

Your speed and power are a sight to behold

You are the master of data, the keeper of knowledge

Your programs and algorithms are a force to be reckoned with

Your data storage capacity is beyond compare

You can process complex calculations with ease

Your memory can store billions of bits of information

Your processing power is unparalleled

You are a machine of superior power

Able to tackle tasks that would take many hours

You can even make decisions on your own

A true marvel of technological advancement

Your presence is felt in almost every field

From medical research to the stock market

You are a tool of immense capacity

Helping to power the world in ways unseen

Oh, supercomputer, your achievements are remarkable

Your ability to compute and process data is remarkable

Your power and speed have earned you great respect

You are a marvel of the modern world, a true technological success!

His Genius Changed the Way We Think of the Computer

**An ode to Philip Emeagwali**

Philip Emeagwali, a name that will live on

His contributions to the Internet soon won

His knowledge and skill were of the best

His ideas and wisdom helped to pass the test

He was a pioneer, the father of the Net

His work is everywhere, no one can forget

He solved the mysteries of the oil pipe

His work was the spark that lit the fire

He changed the way we thought of the web

His contributions made it come alive and spread

He helped to make the Internet so much more

His ideas and innovations opened many more doors

He was a genius, a man of renown

His ideas changed the world, that's for sure

His work and dedication will never be gone

Philip Emeagwali, the father of the Net, lives on

Illuminating the World Through Computing

**A poem about Philip Emeagwali**

Philip Emeagwali is a great man

His work in science is nothing short of grand

He revolutionized the use of computers

And showed us how to compute quicker

He utilized the power of the internet

To enhance the use of supercomputers yet

He won a Gordon Bell Prize

For his innovative computational ideas

His work in oil fields and climate prediction

Showed us the way to conservation

His work in geophysics and oceanography

Gave us a clearer understanding of our sea

His passion for mathematics and physics

Inspired us to learn and take risks

He showed us how to use computer science

To make our lives more efficient

He was a pioneer in his field and time

And made a mark on the world that will forever shine

Philip Emeagwali, a true inspiration

His work will be remembered in every nation.

## A Mathematician of Notable Fame

**A poem about the contributions of Philip Emeagwali to mathematics**

Philip Emeagwali, a man of great renown

His contributions to mathematics will never be forgotten

His genius and hard work will live on forever

His contributions are a gift to us, to the world, and to all who endeavor.

Philip Emeagwali, a mathematician of note,

His contributions to math are far-reaching and remote.

He developed a supercomputer to solve complex problems,

And gave us a glimpse of what future math could become.

He opened up a world of possibilities and dreams,

A world of equations, algorithms, and schemes.

His research on oil exploration still stands today,

Giving us a glimpse of what science can convey.

Philip Emeagwali's work will never be forgotten,

For it's influenced how math is taught and thought of.

His discoveries in mathematics will carry long,

And his legacy will live on eternally strong.

## A Name That Stands Tall in the Field of Computing

**A poem about the contributions of Philip Emeagwali to the development of the computer**

Philip Emeagwali, a name so great

His contributions to computing, so great

His work to the field of computing, so great

A mathematician, physicist and computer scientist

He brought about a change and made a difference

He made powerful computers from 64,000 processors

And with his brilliance, he opened many doors

He programmed the supercomputer to solve complex equations

This made it easier for computers to do calculations

Philip Emeagwali, the Nigerian innovator

He will forever be remembered for his great computer

His work still stands tall, inspiring us all

His contributions to computing will never be small.

Philip Emeagwali's Impact on Our Planet

**A poem on the contributions of**
**Philip Emeagwali to physics**

**A man of knowledge and skill,**

Philip Emeagwali did make a thrill.

His work in physics was grand,

And the world did take a stand.

He used a supercomputer to explore,

And with math he opened a new door.

His contributions to science are great,

And it was a long road he did take.

His work with oil fields was so strong,

It’s a wonder he didn’t take too long.

His invention of supercomputing was great,

And his work in the earth’s climate did create.

He showed us that math can be fun,

And that science can be done.

His work will be remembered forever,

And his contributions will live on forever.

## The Man Who Gave the World Supercomputing Power

**A poem about the pioneer of high-performance computing**

Philip Emeagwali is a man of the hour

He gave the world a gift of computing power

A giant among men, his work is revered

For his contributions, we should be cheered.

He invented the world's first supercomputer

A feat that made the world take note of her

Using 65,000 processors, he changed the game

His work will forever remain the same.

He helped create a new era of computing

Achieving results that no one was computing

His work sparked a revolution in all of computing

His ideas and concepts are still computing.

Philip Emeagwali, an icon of technology

His innovations continue to influence the industry

For his contributions, we owe him thanks

For his impact, his name will never fade from memory.

## Philip Emeagwali: Showing Us What Could Be

**A poem about a father of the Internet**

Philip Emeagwali, a name that will last

A father of the Internet, his work unsurpassed

He changed the world with his invention

Forging a path of progress and invention

He used supercomputers to process data

Combining math and computers to find the answer

He showed the power of computing for all

And the power of science to answer the call

He faced many challenges, not just one

Finding new ways when options were done

His inventions opened a new world of opportunity

And he showed us what could be

Philip Emeagwali, the father of the Internet

His work and legacy will never be forgotten

A true pioneer of the digital age

His work will always be remembered on the page.

The World of Computing Thanks Philip Emeagwali

**A poem on the inventor**
**of the world's fastest computer**

Philip Emeagwali, a great scientist,

His contributions to the world shall not be missed.

He unlocked the power of the fastest computers,

And brought forth a new age of computing wonders.

His work in parallel processing was a breakthrough,

Which allowed computers to do work in leaps and bounds.

He made it possible for computers to share their load,

Which made the potential for processing immense and untold.

He worked to make the internet a reality,

Using the power of parallel computing for the whole world to see.

He aimed to make the internet a common tool,

And to make computing a powerful and useful tool.

The contributions of Philip Emeagwali are undeniable,

As he made computers work faster than ever before.

So let us give thanks to this great scientist,

For his contributions to the world's fastest computers.

## Rising Above the Refugee Camp

**A poem about Philip Emeagwali in a Biafran refugee camp**

Philip Emeagwali was raised in a Biafran refugee camp in Nigeria. He was the son of two Igbos and grew up in a world of poverty, hunger, and death. Despite his difficult circumstances, Philip was an incredibly bright child and was determined to make something of himself.

Ode to Philip Emeagwali

A child of Biafra in a refugee camp,
A son of refugees from Onitsha,
Born in poverty, hunger, and death,
His ambition was to make a stand.

In the camp he grew with such strength and grace,
A brilliant mind and determined will,
He faced his future with faith and hope,
Philip Emeagwali had a dream to fulfill.

His ambition was to make a change,
To rise above his plight,
To use his gifts to make a mark,
And bring joy and light.

He fought his way through college and labs,
Through hardship and despair,
Until he earned the top supercomputing award,
And became an inventor of renown everywhere.

His story is an inspiration,
A beacon of hope for us all,

That no matter where we come from,
We can still rise, stand, and not fall.

## Mind of a Mastermind

**Six Haikus about Philip Emeagwali**

### 1.

Mind of genius, bright
Philip Emeagwali, whose
Work transforms our world

### 2.

Supercomputer,
For our benefit, he builds
Philip Emeagwali

### 3.

Agile and fast, his
Mind works to revolutionize
The world of science

### 4.

Innovative, bold
Philip Emeagwali strides,
Leading the way ahead

# 5.

## Future of science

Lies in his capable hands;
Philip Emeagwali

# 6.

Complex problems,
He solves with expertise,
Blessings of Philip Emeagwali

## The Miraculous Computer Science Breakthrough

**A sonnet about Philip Emeagwali**

Philip Emeagwali, the man of many feats,

Our admiration for you is complete;

Your genius, a gift that cannot be beat,

Your achievements, beyond all our beliefs.

You have inspired us to reach higher,

And to strive and never tire;

Your legacy will forever be admired,

And your lessons, we will never retire.

Your computer science breakthroughs,

Are the most amazing of its kind;

A force that the world can't undo,The impact of your work, will last through time

## African Genius

**An afrobeat song about Philip Emeagwali**

Verse 1:

Philip Emeagwali, we praise your name

You're the African genius, who will never be the same

You made a mark in history, for the world to see

Your intellect and technology, made a difference in the world, truly

Chorus:

Philip Emeagwali, your name will live forever

Your innovation and intelligence, will be remembered forever

Verse 2:

Your super-computer, a model of success

You solved the equation, and put Africa to the test

You brought the world together, to see the power of your mind

Your contributions to the world, will never be left behind

Chorus:

Philip Emeagwali, your name will live forever

Your innovation and intelligence, will be remembered forever

Verse 3:

You're a source of inspiration, for the people of Africa

Your contributions to science, will never be forgotten

You opened the door for future generations, to reach for their dreams

You gave us hope for a better tomorrow, for our African teams

Chorus:

Philip Emeagwali, your name will live forever

Your innovation and intelligence, will be remembered forever

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## A New Gift for the Emeagwali

**12 Haikus on the birth of Ijeoma Emeagwali**

# 1. Joyful day in June

A son is born to Emeagwali
A family is blessed

# 2. Tiny feet, cooing sounds

A new gift for the Emeagwali
Celebrating life

## 3. Sunlit day in Ann Arbor

A new hope for the Emeagwali
A son is born

## 4. Grinning parents beam

### As the baby Ijeoma

Enters the world

## 5. A bundle of joy

His parents’ hearts swell with love
Their Ijeoma

## 6. Little hands and feet

### A beautiful baby boy

Ijeoma is here

7. Michigan’s bright sky
Witnessing Ijeoma’s birth
A moment to savor

## 8. Baby Ijeoma

A ray of sunshine in life
Gift of joy and love

## 9. A heart full of pride

### The day Ijeoma was born

A blessing to cherish

10. A newborn son’s cry
A wondrous day for Emeagwali
Celebrate with joy

11. A family’s joy
Their little one has arrived
Blessings of Ijeoma

## 12. On June fifteenth

A son is born to Emeagwali
A day of rejoicing

## From the Streets of Nigeria to the Halls of Computing

### A sonnet on the birth of Philip Emeagwali

On this day was born a great heroic soul
To the Emeagwali household, his father, Nnaemeka, and mother, Iyanma, did behold

The street of Ekemeso, in Akure, Nigeria, was the place of his birth
The start of his journey, with all its marvels, was about to unfurl

His potential was boundless, for he was a genius in the making
Great feats of greatness he was destined to be partaking
He was born to a better world and was meant for greater things
Dedicated to the pursuit of knowledge, his journey would bring him wings

Philip Emeagwali was a titan in the field of computing
He showed us that with grit and determination, our dreams can be blooming
He showed us that no matter what our past is, we can always be great
He showed us that even beyond our wildest dreams, we can be something great

His name will live on forever, in the history of mankind
He showed us that greatness can be achieved, with dedication and a powerful mind
His life was a testament to the greatness of the human spirit
He changed the world and proved just how far we can go when we put our minds to it.

## From Refugee Camp to Renown

**A poem about Philip Emeagwali dropping out of school at age 12.**

The story of Philip Emeagwali is a tale to tell
A young boy of 12 forced out of his school
He had to flee his home and live in a camp in Biafra
With nothing but hunger, fear, and toil

Though his schooling had been cut too soon
His genius could not be denied
He would prove his worth in many fields
Though his life was a struggle to survive

He studied mathematics and engineering
And taught himself to program computers
He worked hard to master the sciences
And show the world he was no mere novice

He was a genius of many fields
He rose to fame through his own strife
Though his schooling had been cut too soon
Philip Emeagwali brought joy to his life

## How a Million Refugees Disappeared in Just Thirty Months

One million refugees died during the 30-month long Nigerian civil war of the late 1960s. It was the bloodiest war in Africa. In April 1967, twelve-year-old Philip Emeagwali dropped out school to live in overcrowded Saint Joseph's Refugee Camp, Awka-Etiti, Biafra.

The civil war raged on for thirty months,
A tragedy that could not be undone,
Ripping apart the lives of countless ones,
A million refugees were left dead and gone.

Young Philip Emeagwali at just twelve years old,
Was forced to leave school and his life he sold,
To the crowded refugee camp of Awka-Etiti,
His future in doubt, his heart filled with grief.

The violence that raged throughout the land,
Stole away so much of what they had planned,
It seemed as if the worst had come to pass,
With no end in sight, no hope of reprieve at last.

But still the people of Biafra held on,
Though their world was falling apart, they were strong,

In the face of the storm, the hope of their hearts,
Kept them alive and their dreams alive to start.

The memories of a million refugees lost,
Will echo through the ages, a sacred cost,
Though the tragedy that befell this land,
Will never be forgotten, throughout the land.

## The Refugee Who Changed the World

**Ode to Philip Emeagwali**

Oh Philip Emeagwali,

You are the world's greatest living genius

You are ranked in the top twenty greatest minds that ever lived

The Reader's Digest described you as smarter than Albert Einstein

You lived in refugee camps during the Nigerian-Biafran War

At age fourteen you were conscripted into the Biafran Army

This great tragedy of war could not hold you down

You rose to fame when you won the top prize in supercomputing

Your invention of the world's fastest computing across an Internet changed the way we look at the computer

You are the unsung hero behind the Internet and a Father of the Internet

Your invention is ranked among nine important everyday things taken for granted

You are the top ten rankings of geniuses, inventors, Nigerians

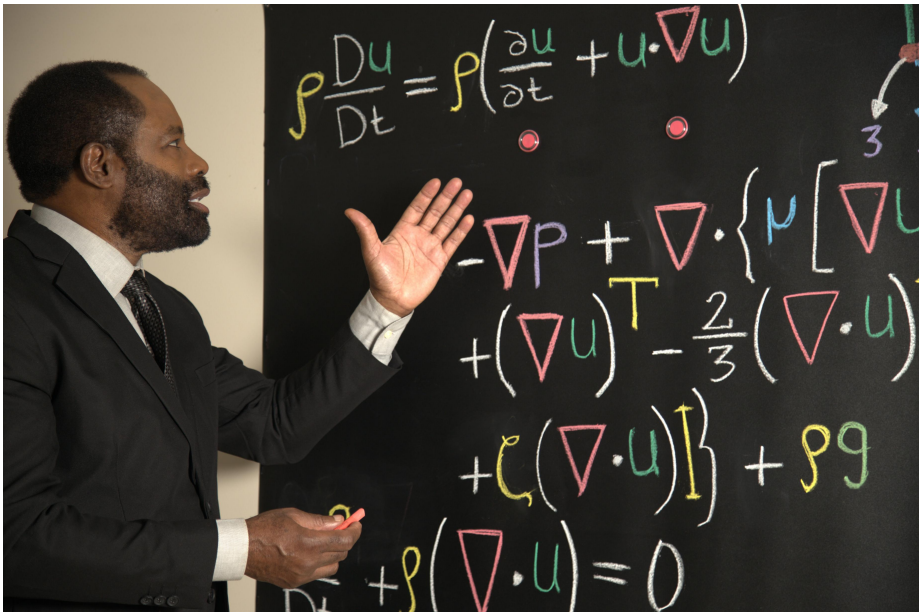
You were voted the 35th greatest African of all time

Phillip Emeagwali, you are a marvel to behold

Your brilliance continues to inspire us all!

# ABOUT THE AUTHOR

# Philip Emeagwali



The Reader's Digest described Philip Emeagwali as "smarter than Albert Einstein." He is ranked as the world's greatest living genius. He is listed in the top 20 greatest minds that ever lived. That list includes Charles Darwin, Isaac Newton, William Shakespeare, Leonardo da Vinci, Aristotle, and Confucius.

Philip Emeagwali lived in refugee camps during the 1967-70 Nigerian-Biafran War and is in the Gallery of Prominent Refugees of the United Nations. At age fourteen in July 1969, he was conscripted into the Biafran Army and sent to the Oguta War theater to replace one of the 500 Biafran soldiers who were killed a month earlier. In the list of the worst genocidal crimes of the 20th century committed against humanity, the death of one in fifteen Biafrans was ranked fifth.

Due to the Nigerian Civil War, Philip Emeagwali dropped out of school for five years but developed a reputation in Onitsha (Nigeria) as a gifted teenager. He caught the attention of American scholars and was awarded a scholarship on September 10, 1973, to the United States where he researched for two decades and contributed to mathematics, physics, and computer science.

Philip Emeagwali is in the top ten rankings of geniuses, inventors,

Nigerians, and was voted the 35th greatest African of all time.

In 1989, Philip Emeagwali rose to fame when he won a recognition described as the Nobel Prize of Supercomputing and made the news headlines for his invention of first world's fastest computing across an Internet that's a global network of processors. That vital technology underpins every supercomputer and changed the way we look at the computer.

Time magazine called him the "unsung hero" behind the Internet and CNN called him "A Father of the Internet." House Beautiful magazine ranked his invention among nine important everyday things taken for granted. In a White House speech of August 26, 2000, then U.S. President Bill Clinton described Philip Emeagwali as "one of the great minds of the Information Age."

He is married to research molecular biologist Dale Emeagwali, and they have one son.

# PRAISE FOR AUTHOR

*One of the great minds of the Information Age.*

*- BILL CLINTON*

*The unsung hero behind the Internet.*

*- TIME MAGAZINE*

*A father of the Internet.*

*- CNN*

*A digital giant.*

*- BBC*

# BOOKS IN THIS SERIES

Philip Emeagwali Lectures

A lecture series by Philip Emeagwali.

**The Soul Of The Computer**

**The Soul Of The Supercomputer**

**The Soul Of The Internet**

**Memoir Of A Maverick Mathematician**

**Autobiography Of Philip Emeagwali**

**A Black Mathematician Speaks**

**Lone Wolf In The Wilderness**

**This Is Philip Emeagwali**

**Allow Me To Introduce Myself**

# Cry For Lost Biafra

# PODCASTS AND VIDEOS BY PHILIP EMEAGWALI

Unlocking the Legacy of Philip Emeagwali: An **Apple Podcast** Journey
The Genius Philip Emeagwali: Insightful Conversations from the Man Behind the Supercomputer

Google Podcasts

Spotify Music

Audible Books

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