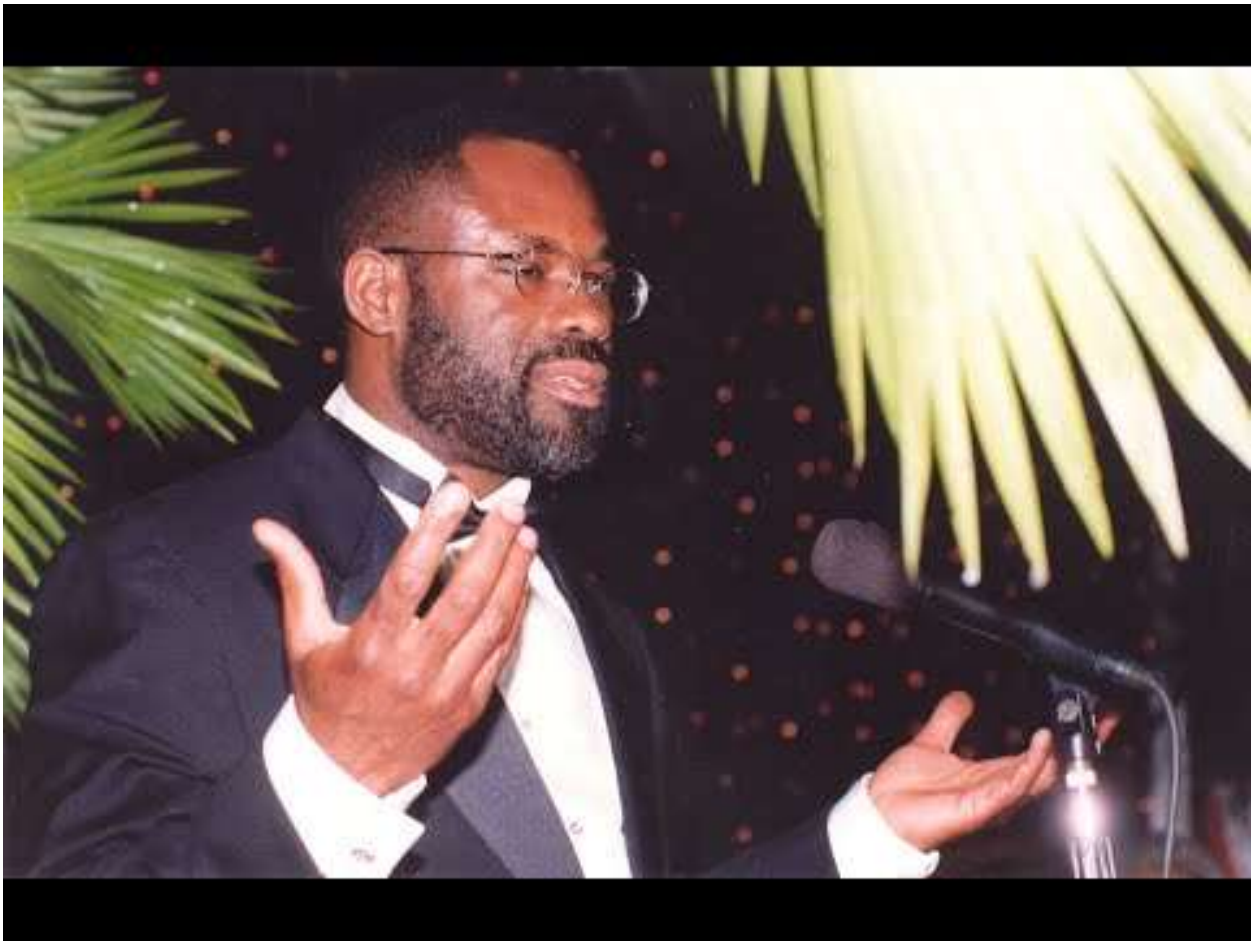
Philip Emeagwali
info@emeagwali.com 202-203-8724

Thunder Road from Biafra to the World's Fastest Computer

Transcript of Philip Emeagwali YouTube lecture 210829-1of4 for the video posted below.

Click below to watch Philip Emeagwali on YouTube.com.



https://youtu.be/gZxCy0nGaps

Philip Emeagwali

The Reader's Digest **described Philip Emeagwali as "smarter than Albert Einstein." Philip Emeagwali is often ranked as the world's greatest living genius and scientist. 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, Pythagoras, and Confucius. Philip Emeagwali is studied in schools as a living historical figure.**

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 the first world's fastest computing across an Internet that's a global network of processors. ***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,**

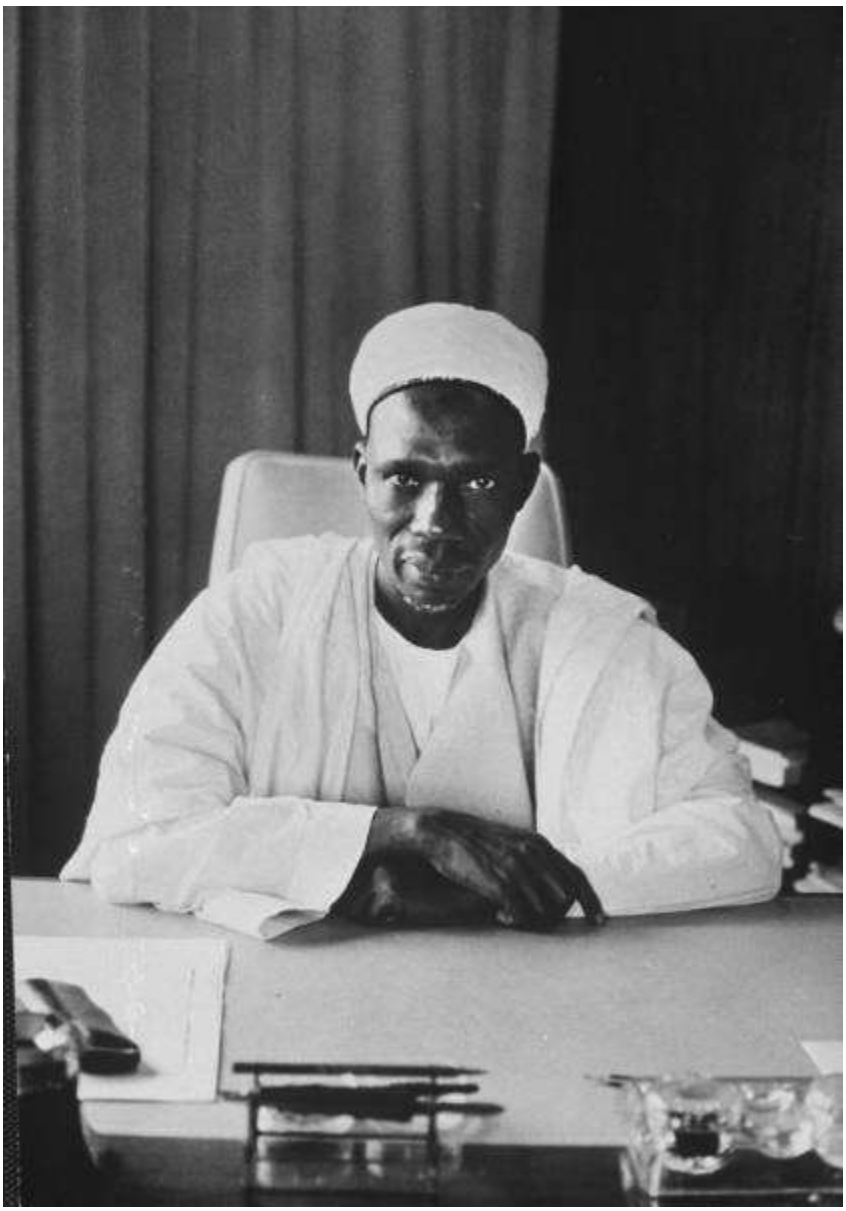
then U.S. President Bill Clinton described Philip Emeagwali as "one of the great minds of the Information Age."

Thank you. I'm Philip Emeagwali.

Thunder Road from the Bloodiest Battlefield in African History
One Day We Had to Run to Biafra!
The Day of the Long Night

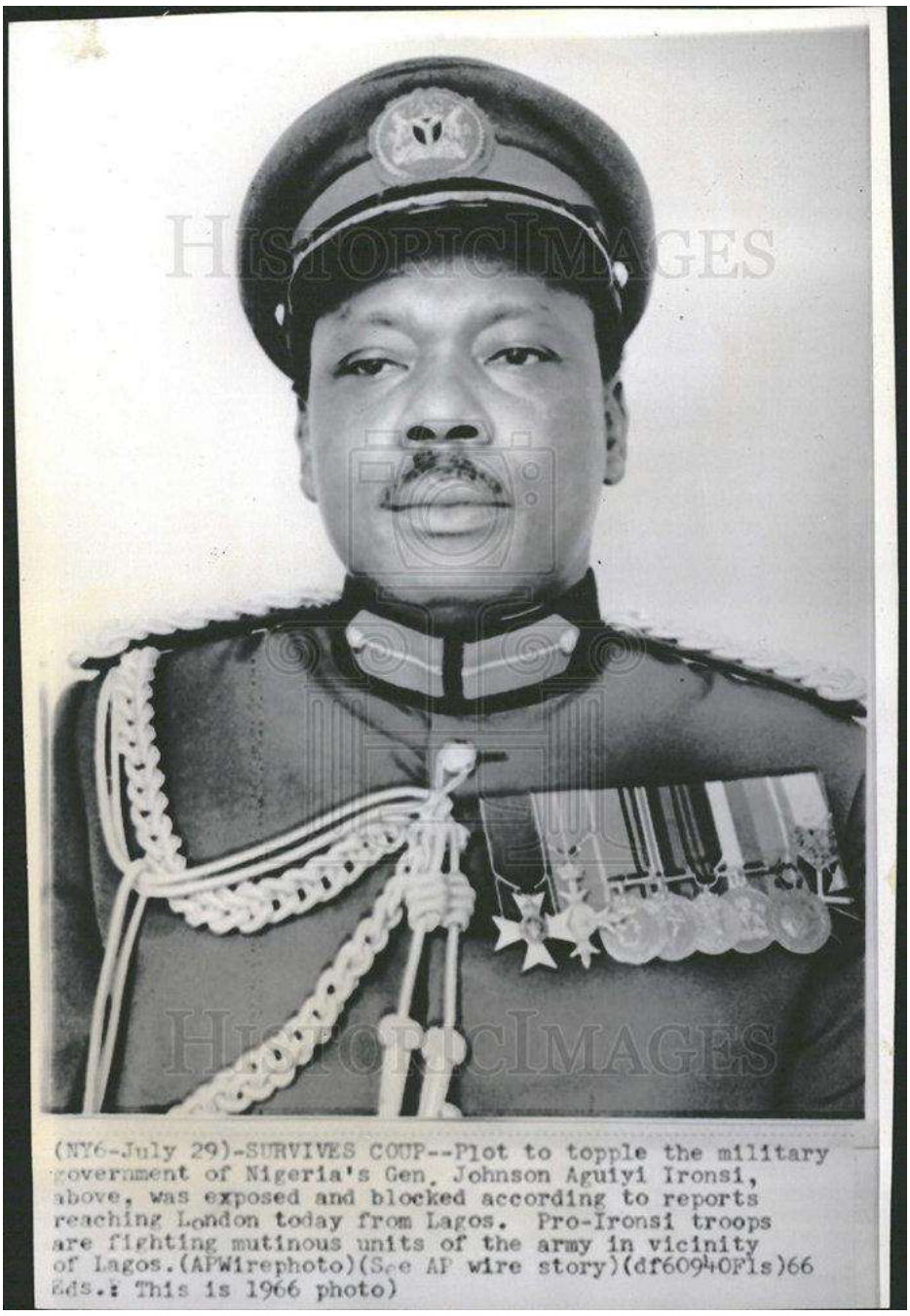
In April 1967, I was twelve years old,
and my country of birth, Nigeria,
was torn apart
by the earlier bloody military coup
of January 15, 1966.
During that coup, our Prime Minister,
Abubakar Tafawa Balewa,
was killed.
Six months later, Nigeria was again
torn apart by a bloody counter coup
during which 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.



Former prime minister of Nigeria, Abubakar Tafawa Balewa

Sir Ahmadu Bello



Major-General Johnson Aguiyi-Ironsi

10.1.1.1 One Day We Had to Run!

Thomas Brendan Kennedy

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.

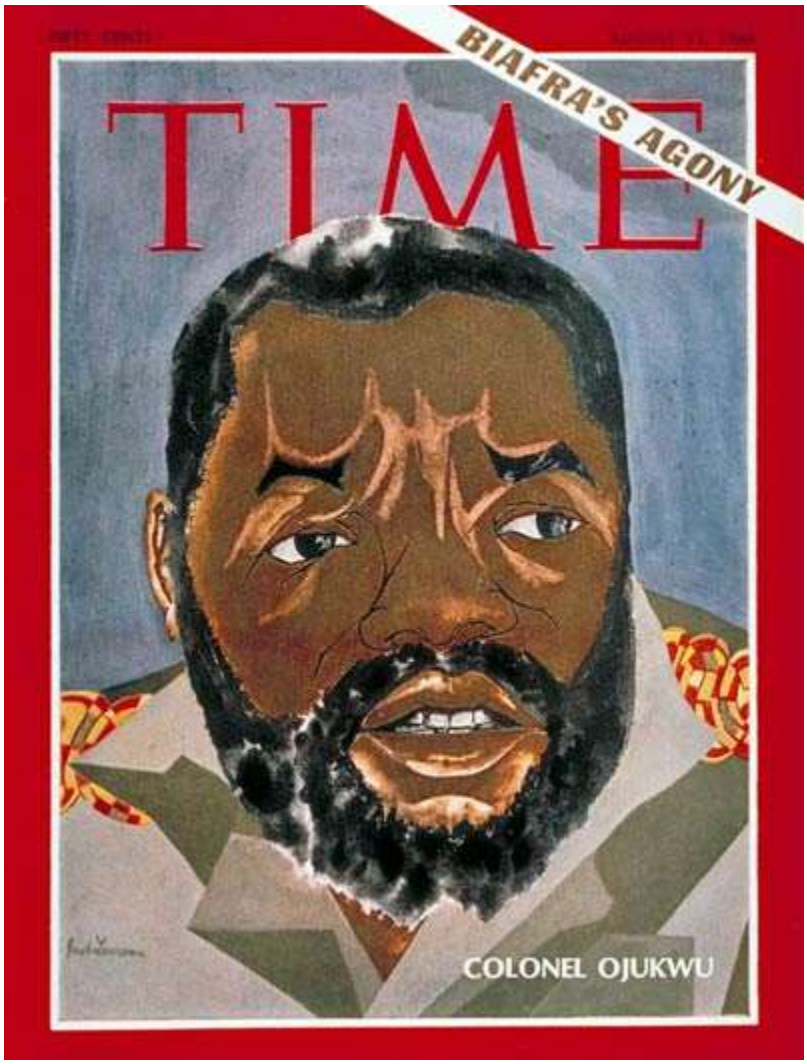
In April 1967, the Nigerian ethnic killings
and civil uprisings has worsened.
And about a dozen Igbo-speaking students
from the heart of Igbo land
who were studying at Saint George's

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.

10.1.1.2 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.

10.1.1.3 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.

On Inventing the World's Fastest Computer

10.1.1.4 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.

10.1.1.5 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.

10.1.1.6 Quantifying the Contributions of Philip Emeagwali to the Supercomputer

The Second Niger Bridge at Onitsha, Nigeria.

Ongoing construction of the Second Niger Bridge. The world's fastest computer costs 40 percent more than the mile-long Second Niger Bridge

at Onitsha, my ancestral hometown in Nigeria.

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.

10.1.1.7 How I Leapfrogged from the Slowest to the Fastest Computing

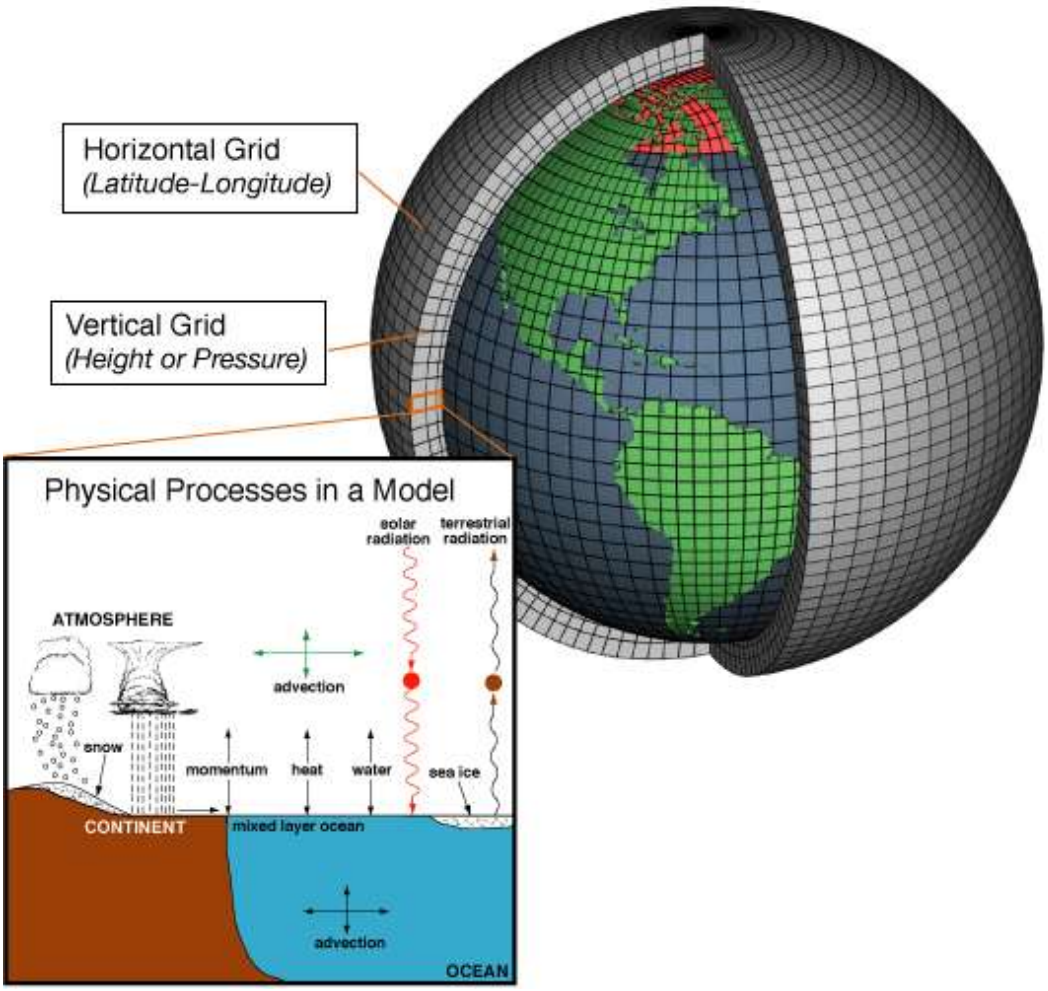
The world's fastest computer occupies the footprint of a soccer field and costs forty percent more than the mile-long Second Niger Bridge of Nigeria.

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.

10.1.1.8 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*.

The World's Fastest Computer

Inventing the World's Fastest Computer

10.1.1.9 Obstacles to 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?"

10.1.1.10 Friends of Parallel Supercomputing

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 1980s, 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.

10.1.1.11 Visualizing Supercomputing in Space-Time

President Bill Clinton extolled Philip Emeagwali as "one of the great minds of the Information Age."

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.

For me, Philip Emeagwali,
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.

10.1.1.12 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.

Invention of the Fastest Computer

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.

Using the Nine Philip Emeagwali Equations

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.

Emeagwali Leapfrog from Slowest Processing 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 Supercomputer Invention

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, Philip Emeagwali,
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 do we develop the world's fastest computer?

How do we invent a new supercomputer?

How are the world's fastest computers made?

People often ask:

"How is the supercomputer different from the computer?"

The world's fastest computer
weighs as much as eight thousand
Africans. 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 1989.
Both are the prototypical problems
of large-scale
computational fluid dynamics.

How are the most powerful computers used?

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.

Supercomputing Around a Spherical Island of Processors

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.

How do we achieve 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.

How can you visualize the world's fastest
computer as 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 16^{th} 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 16^{th} 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 16^{th} 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.

Thank you. I'm Philip Emeagwali.

Further Listening and Rankings

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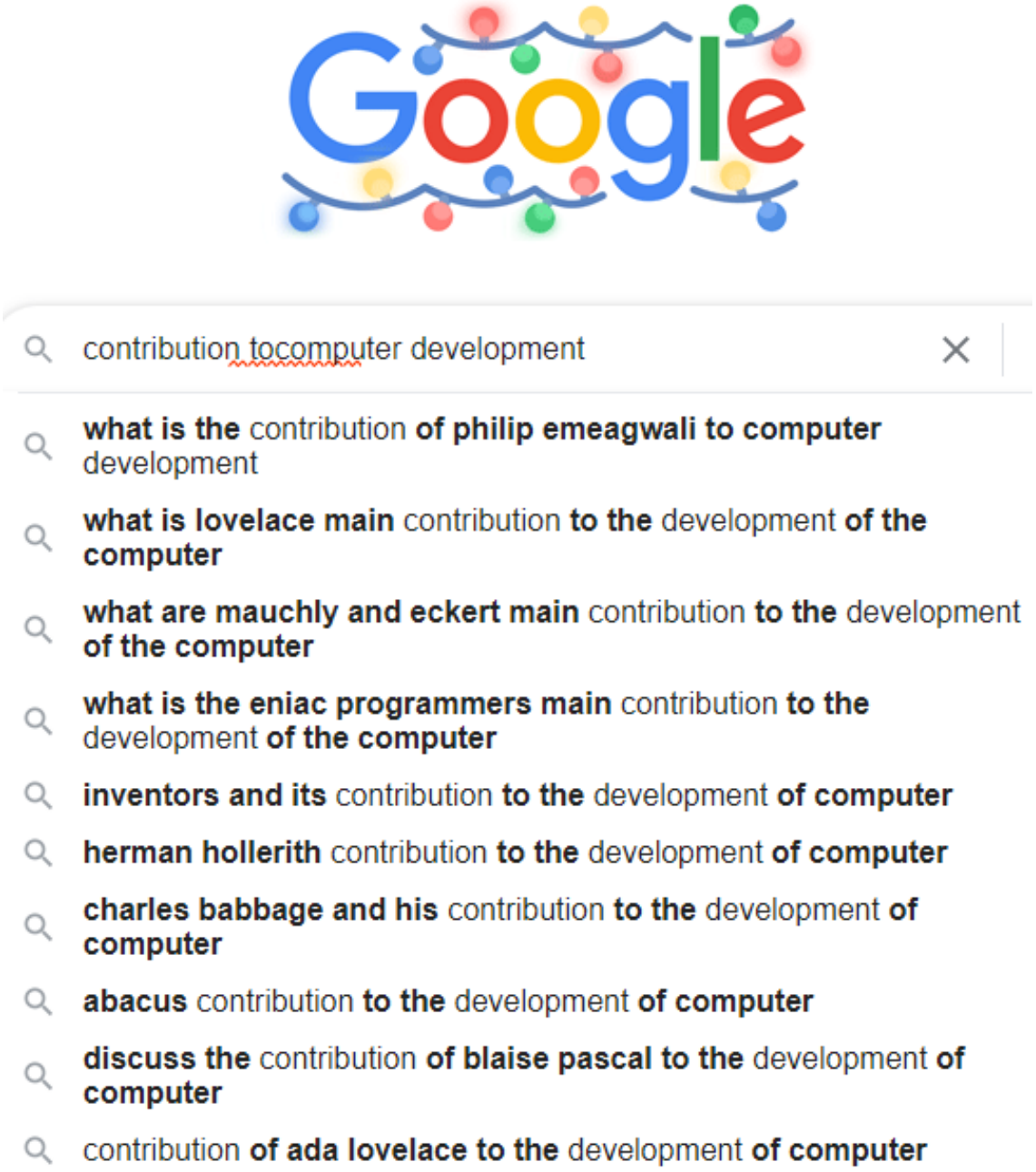

Google suggests the greatest computer scientists of all times. With the number one spot, Philip Emeagwali is the most suggested computer pioneer for school biography reports across the USA, Canada, UK, and Africa (December 8, 2021).

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).

Philip Emeagwali
info@emeagwali.com 202-203-8724

Combining Computers to Create an Internet That's a Planetary Supercomputer

Transcript of Philip Emeagwali YouTube lecture 210829-2of4 for the video posted below.

Click below to watch Philip Emeagwali on YouTube.com

https://youtu.be/JmG1zrbyHrQ

Philip Emeagwali

The Reader's Digest **described Philip Emeagwali as "smarter than Albert Einstein." Philip Emeagwali is often ranked as the world's greatest living genius and scientist. 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, Pythagoras, and Confucius. Philip Emeagwali is studied in schools as a living historical figure.**

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 the first world's fastest computing across an Internet that's a global network of processors. ***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."

Internet That's a Billion Computers

The Philip Emeagwali Internet

Visualizing the Philip Emeagwali Internet

Thank you. I'm Philip Emeagwali

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.

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."

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.

My Contribution to Physics of Fluid Dynamics

The experimental X-59 aircraft

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 early 1980s, Philip Emeagwali jogged across Rock Creek Park of Washington DC

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

10.1.1.13 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 multidisciplinary mathematician
who posted one thousand
multidisciplinary videos
on the Emeagwali YouTube channel.
That was the reason
I was described me as an autodidact
[au·to·di·dact],
and the person who invented
the world's fastest computing
across up to a billion processors.

In the late 1970s, Philip Emeagwali lived in Adams Morgan, Washington, DC.

I Discovered a 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 multidisciplinary 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.

Visualizing Philip Emeagwali Internet as a Billion Computers Working Together

Visualizing a New Supercomputer

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.

How Did Philip Emeagwali Impact 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.

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

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

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.

My Contribution Changed the Way We Look at Supercomputers

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.

Further Listening and Rankings

Search and listen to Philip Emeagwali in

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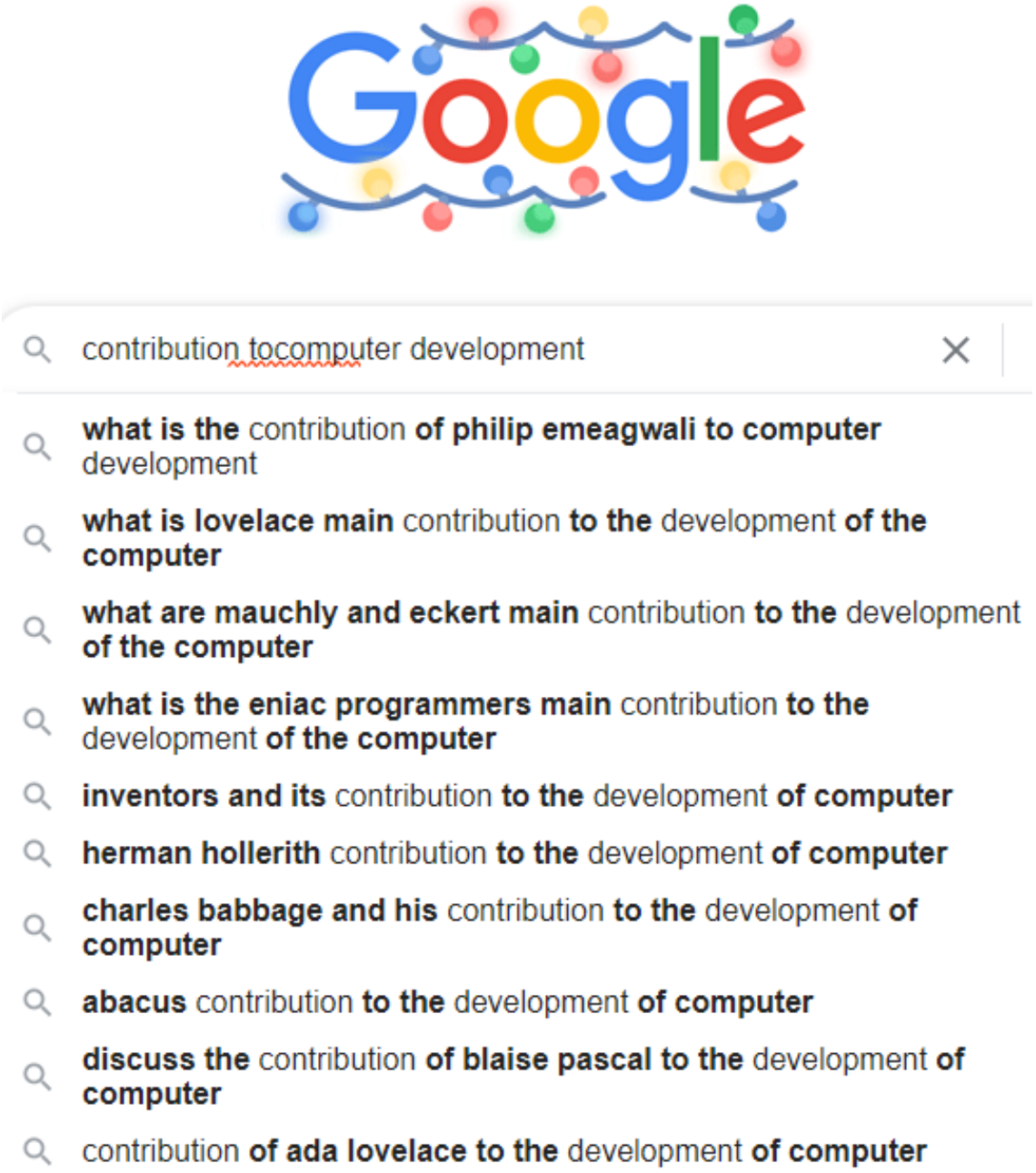


Google suggests the greatest computer scientists of all times. With the number one spot, Philip Emeagwali is the most suggested computer pioneer for school biography reports across the USA, Canada, UK, and Africa (December 8, 2021).

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).

Philip Emeagwali
info@emeagwali.com 202-203-8724

Inventing the First Supercomputer (Around My Spherical Island of Processors)

Transcript of Philip Emeagwali YouTube lecture 210829 3of4 for the video posted below.

Click below to watch Philip Emeagwali on YouTube.com

https://youtu.be/p6REP9kI7_U

Philip Emeagwali

The Reader's Digest **described Philip Emeagwali as "smarter than Albert Einstein." Philip Emeagwali is often ranked as the world's greatest living genius and scientist. 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, Pythagoras, and Confucius. Philip Emeagwali is studied in schools as a living historical figure.**

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 the first world's fastest computing across an Internet that's a global network of processors. ***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."

Thank you. I'm Philip Emeagwali

Crossing New Frontiers

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.

Father of the Internet

The First Supercomputer

My Diary from a Biafran Battlefield

Onitsha Was the Bloodiest Battlefield in Africa

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

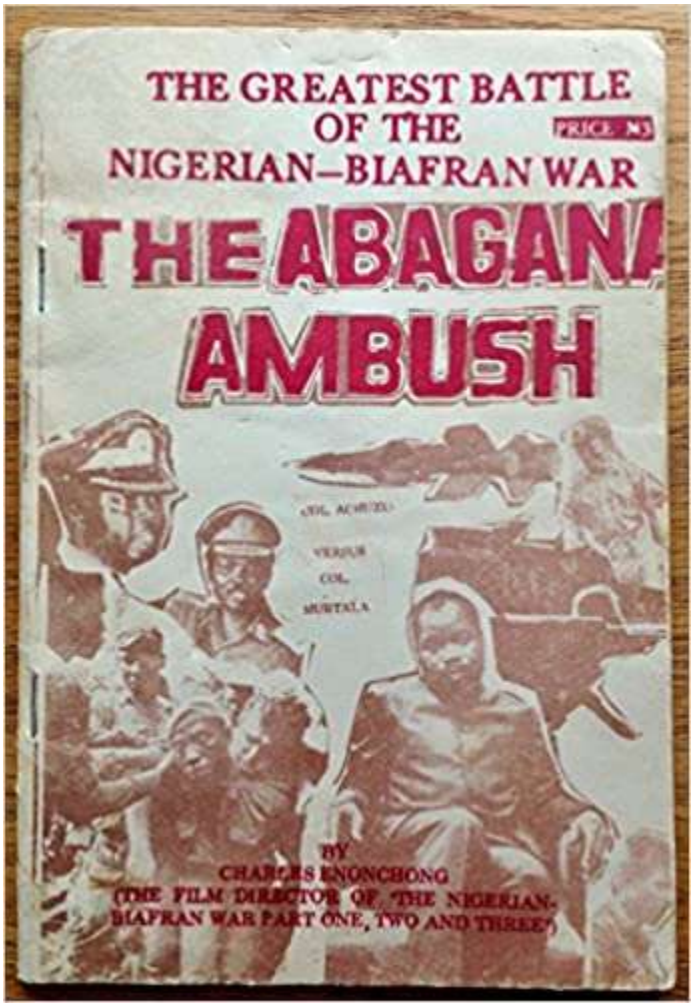
from the nearby Abagana battlefield.
Those Biafran soldiers were fleeing
beyond Onitsha and towards Oba
and Nnewi.
Unknown to us, namely
the Biafran refugees in Onitsha,
was that the Biafran soldiers
who should protect us
were routed by the Nigerian Army
and were disorganized.
Biafran soldiers defending 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



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.

How Refugees Became Biafran 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.

World's Fastest Computer

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 two-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

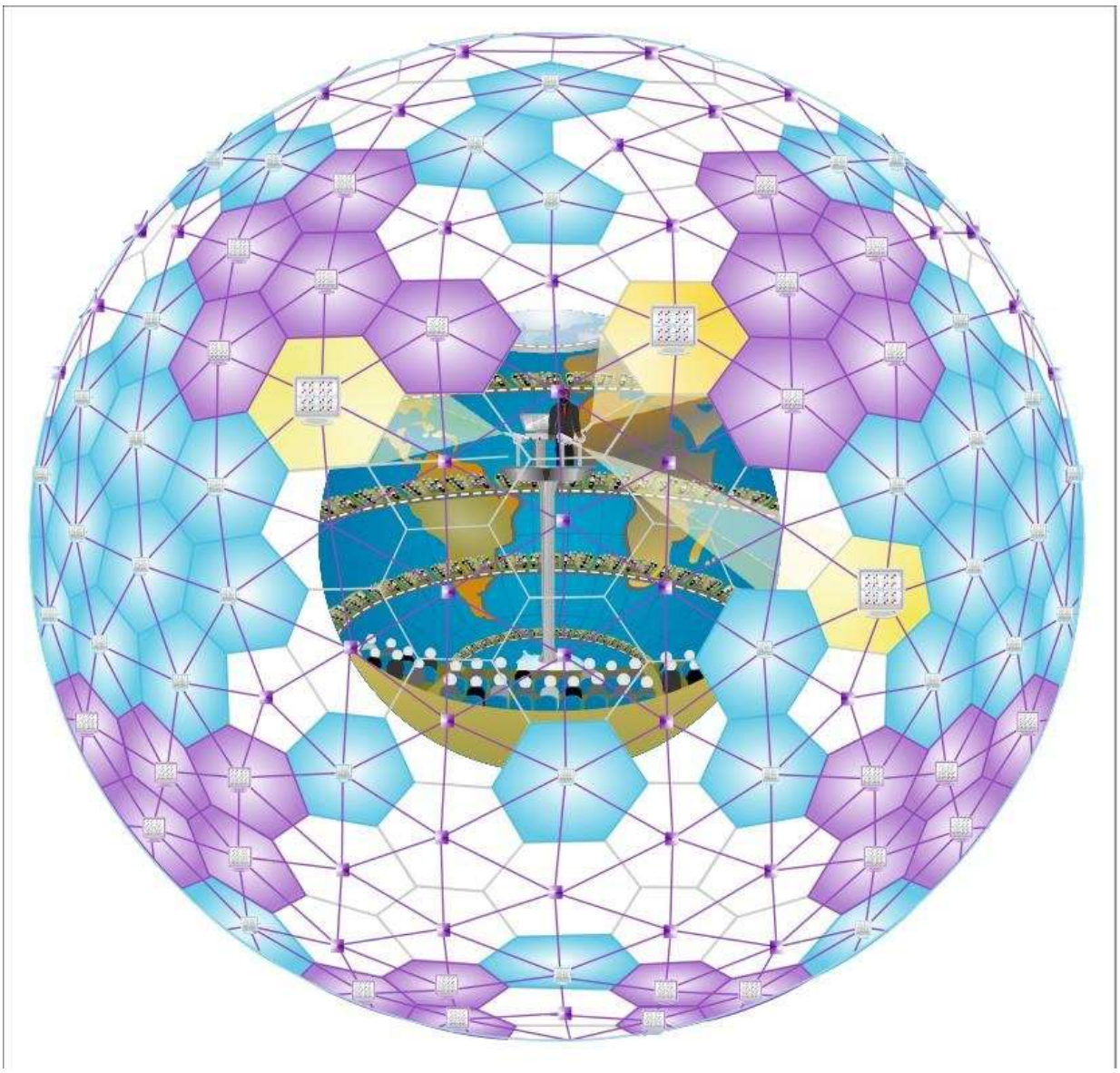
can't solve the toughest
initial-boundary value problems
at the frontiers of calculus,
compute-intensive algebra,
or extreme-scale
computational fluid dynamics.
And solve such physics problems
by merely waving his, or her, hand.
As a high-performance
computational mathematician,
I can only discover the 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.
My visualization
of my new Internet

was new.
Therefore, the word "Internet"
wasn't in my vocabulary
in the mid-1970s.
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 1989.
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.

I'm Philip Emeagwali. Thank you.

Philip Emeagwali
info@emeagwali.com 202-203-8724

Inventing the First Supercomputer | That's the First Internet

Transcript of Philip Emeagwali YouTube lecture 210829-4of4 for the video posted below.

Click below to watch Philip Emeagwali on YouTube.com.

https://youtu.be/Yc3Mbl1l8Tk

Philip Emeagwali

The Reader's Digest **described Philip Emeagwali as "smarter than Albert Einstein." Philip Emeagwali is often ranked as the world's greatest living genius and scientist. 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, Pythagoras, and Confucius. Philip Emeagwali is studied in schools as a living historical figure.**

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 the first world's

fastest computing across an Internet that's a global network of processors. *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."

Inventing the World's Fastest Computer

Inventing a Never-Before-Seen Computer

A Billion Computers Working Together

Thank you. I'm Philip Emeagwali.

Crossing New Frontiers

Father of the Internet

The First Supercomputer

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.

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

Struggles to Invent the World's Fastest Computer

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 oversimplification
to claim that calculus
was co-invented, 330 years ago,
by Isaac Newton
and Gottfried Wilhelm von Leibniz.
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.

James Meredith, the first African American allowed to enroll in the University of Mississippi

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 1980s
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 1970s and 80s—the two decades
during which I came of age—
was like the racial diversity
in U.S. mainstream radio broadcasting
of the 1920s and 30s.
In the 1940s and 50s,
African-American entertainers
were forced to use a different door
to enter white radio stations.
In the 1970s and 80s,
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 1950s,
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.

How Did Philip Emeagwali Impact the Fastest Computers?

Inventing the World's Fastest Computer

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 1970s, 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 1946,
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.

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-1970s 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, Kazakhstan, 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.

Contributions of Philip Emeagwali Equations to Physics

In the early 1980s,
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.

Thank you. I'm Philip Emeagwali.

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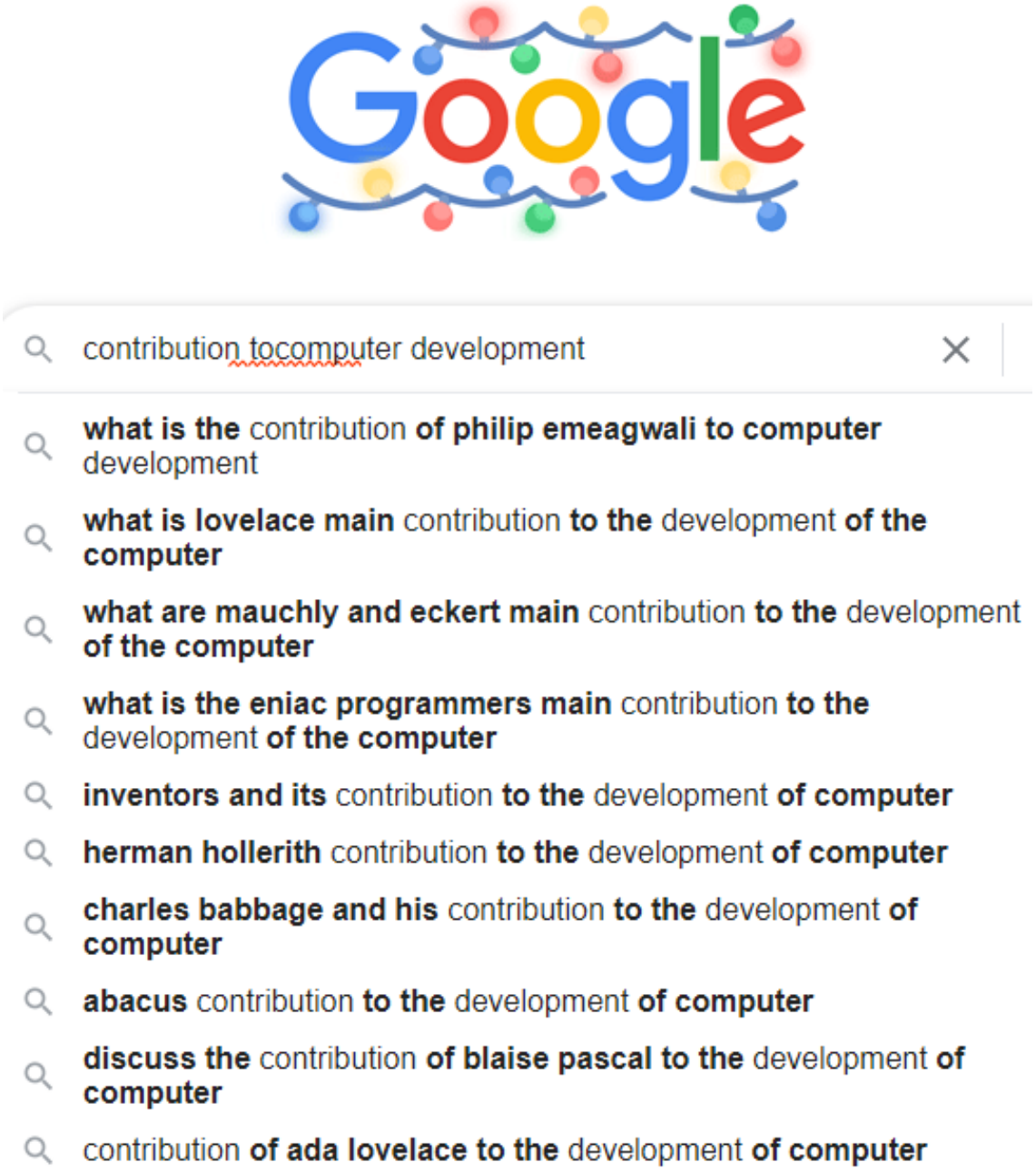

Google suggests the greatest computer scientists of all times. With the number one spot, Philip Emeagwali is the most suggested computer pioneer for school biography reports across the USA, Canada, UK, and Africa (December 8, 2021).

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).