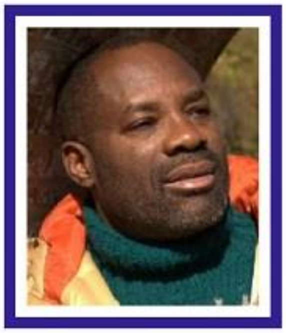

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Biggest Advance Since Newton, Galileo

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Delivered by Philip Emeagwali
emeagwali.com

ABSTRACT
Philip Emeagwali 23rd August 1954. A Nigerian-American pioneer of the modern supercomputer best known as a father of the internet.

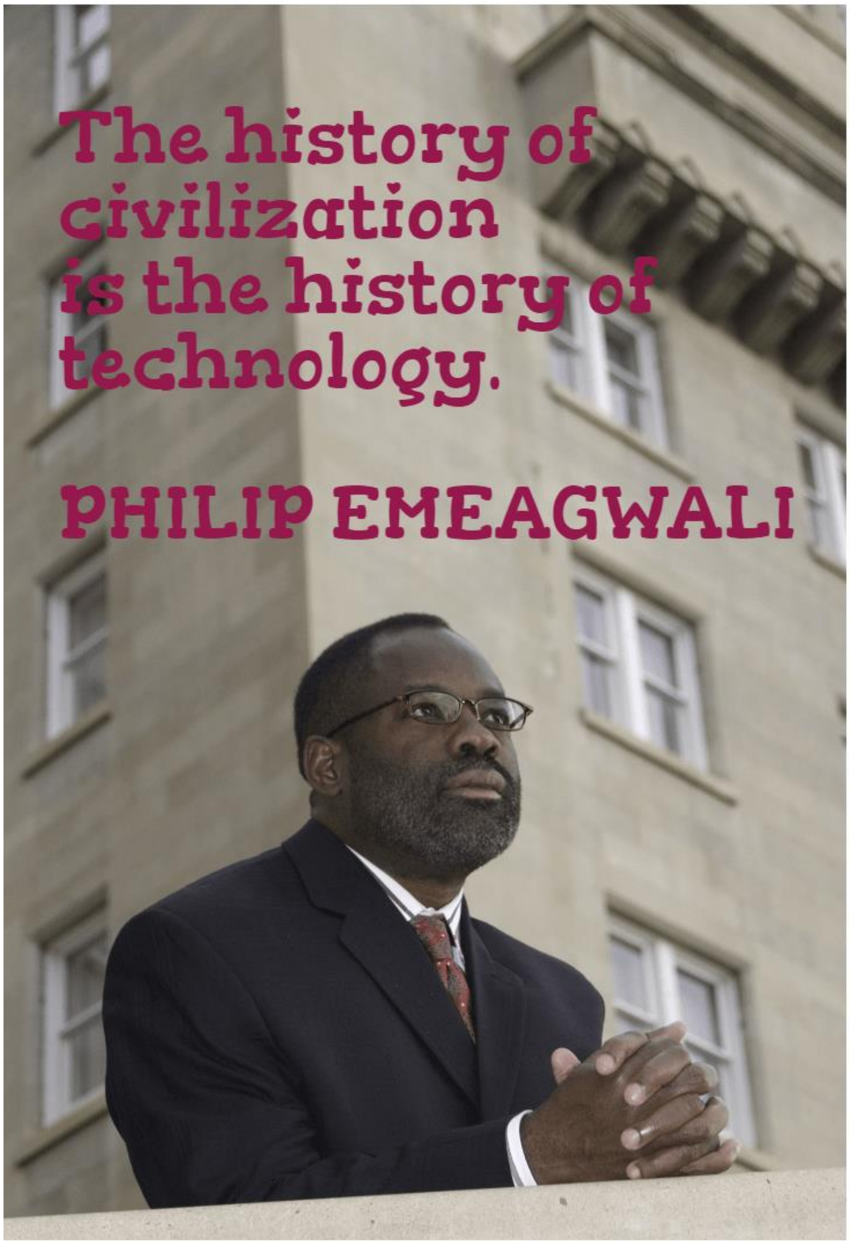
1 Biggest Advance Since Newton, Galileo—Part 1

The computer
is the greatest invention
of the 20th century.
Parallel processing
is the biggest advance
in the history of the supercomputer
and computational physics.

Inventing a New Supercomputer

The history of civilization
is the history of technology.
Fire is man's first invention,
or rather man's first discovery.
Who domesticated the first chicken?
Who domesticated the first goat?
Who rode the first horse?
The names of ancient scientific pioneers
are lost in the mist of time.
Who solved the first

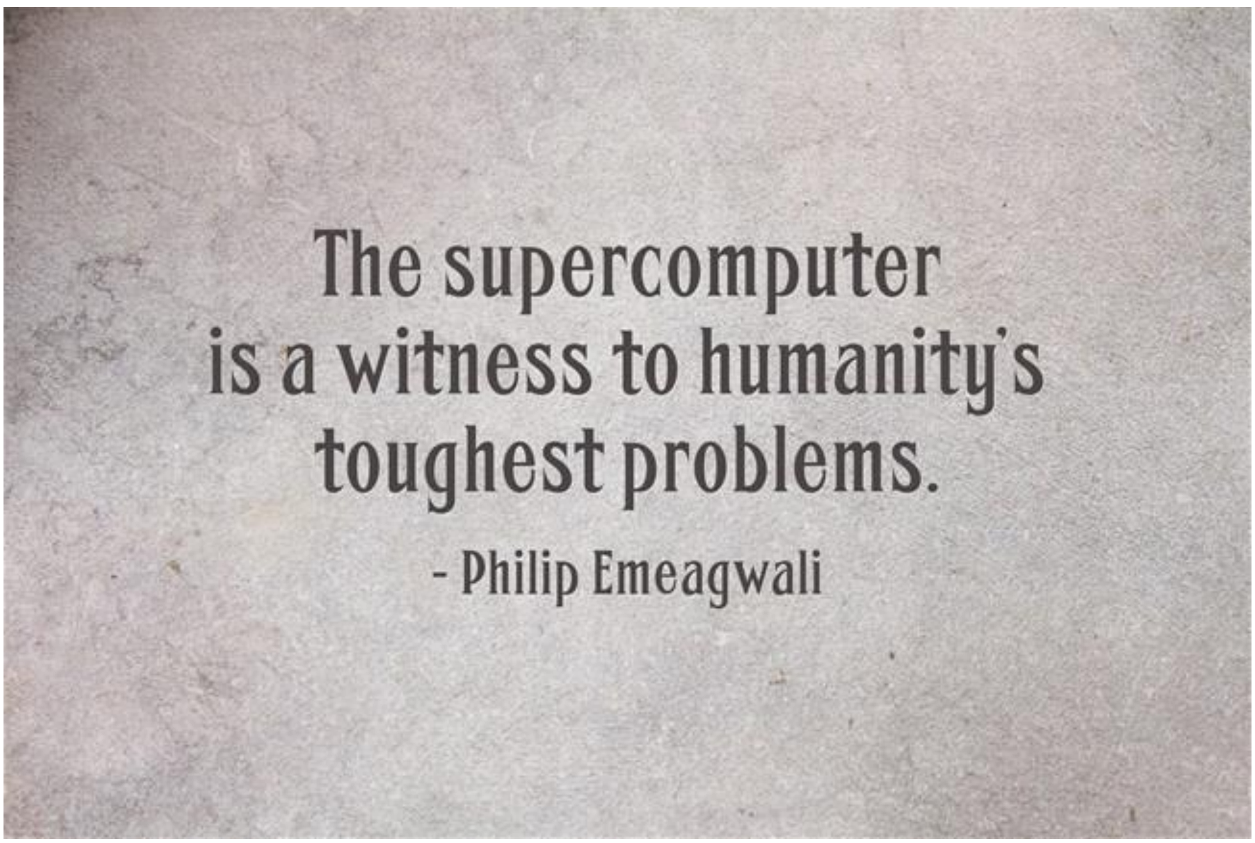
quadratic equation?
Who programmed
the first ensemble of processors
that led to the discovery
of the modern supercomputer
that computes in parallel?
Parallel processing—the technology
that makes the new computer **faster**
and makes the new supercomputer **fastest**—
is the most important invention
in the history of computer technology.



The experimental invention
of the massively parallel processing supercomputer
—that solves many problems **at once**,
instead of solving only one problem
at a time—

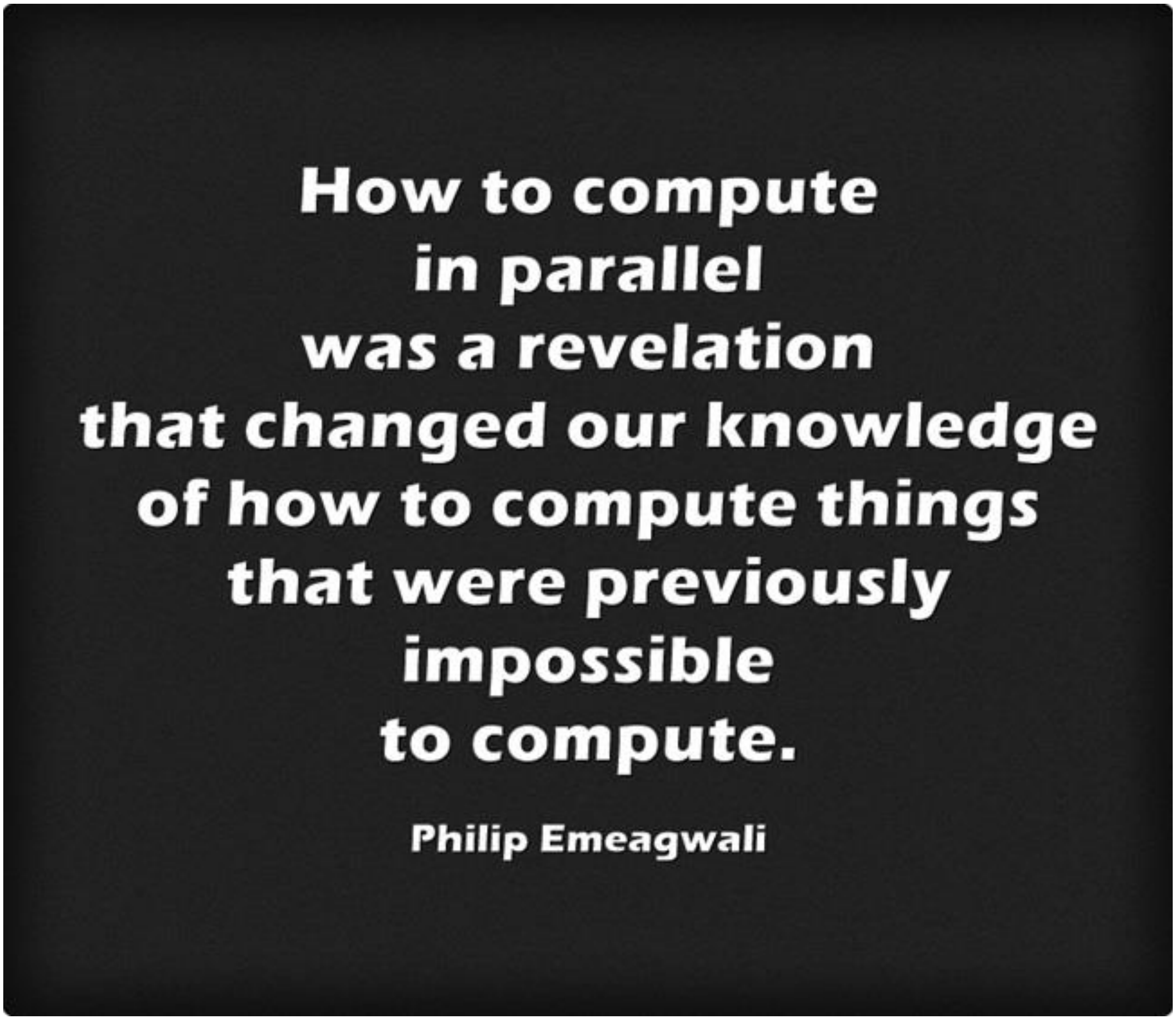
and its absorption into new computers
and into new supercomputers
is one of computing industry's
most hopeful narrative.
For two hundred millennia,
we discovered
to make our world
a more knowledgeable place.
We discovered
to discover new fields of study.
The new field of study
that I discovered,
in the 1970s and '80s,
is called massively parallel processing
supercomputing.
I discovered that new field of study
by conducting my sixteen-year-long quest
between fields,
between classical physics
and modern mathematics,
between abstract calculus
and extreme-scale algebra,
and between

the most computation-intensive
floating-point arithmetical operations
and the largest ensemble of processors.
The supercomputer
is a witness to humanity's
toughest problems.



The supercomputer
doesn't just solve the toughest problems
in extreme-scale computational physics.
The supercomputer

is the modern diving rod
for discovering more oil and gas.
The supercomputer
is the **crystal ball**
for foreseeing otherwise unforeseeable
global warming.
The supercomputer
is an instrument for telling the future.
I discovered that
the global circulation model
that is executed **across** a new internet
that's a global network of
commodity processors,
or a new global network as many computers,
and that emulates **a new supercomputer**
can be used to gaze across the centuries.
The discovery of **how to compute**
in parallel
was a revelation
that changed our knowledge
of how to compute things
that were previously impossible
to compute.



The big question was
"Can an ensemble
of the slowest processors
outperform the fastest supercomputer
and change the way
we look at the modern computer?"

For the fifteen years
onward of June 20, 1974,
this parallel processing research project
kept me up at night.
In the final days
leading to my experimental discovery
of massively parallel processing,
a discovery that occurred
on the Fourth of July of 1989,
I had my heart in my throat.
I had the visceral feeling
that my massively parallel processing
supercomputer results
were historic.
That experimental discovery
of the massively parallel processing
supercomputer
is the reason children
are writing school reports titled:
"The Contributions
of **Philip Emeagwali**
to the Development of the Computer."
On that Fourth of July of 1989,

the first direct measurement
of the fastest computation ever recorded
across
an ensemble of processors
was recorded.
On that Fourth of July of 1989,
I experimentally discovered
that massively parallel processing
supercomputers
can solve computation-intensive problems
that neither sequential processing
supercomputers
nor vector processing supercomputers
can solve.
My experimental discovery
was about making grand challenge
initial-boundary value problems
of extreme-scale computational physics
that are impossible-to-solve
possible-to-solve.
I experimentally discovered
how to massively parallel process
the most computation-intensive problems

in physics
and how to massively parallel process them
so that a **time-to-solution**
of thirty thousand years
can be reduced
to a **time-to-solution**
of just one day.
My contribution to physics
is this:
Before my experimental discovery
of the massively parallel processing
supercomputer
that occurred on the Fourth of July of 1989,
the most extreme-scale
computational physics codes
were only executed on only one
supercomputer.
After my experimental discovery
of the massively parallel processing
supercomputer
the most extreme-scaled
computational physics codes
were only executed **across**

millions upon millions
of commodity-off-the-shelf processors.

The Land Before Parallel Processing

In summary, **we knew**
the land before parallel processing
and we named that land
sequential processing,
or the land where we computed
only one thing **at a time**.
We knew the most important laws in physics
and we knew them
three centuries and three decades ago.
We knew how to encode
those laws of physics
as the most advanced expressions
in calculus
called partial differential equations
and we knew them
nearly a century and a half ago.
We knew how to discretize
those partial differential equations

to their algebraic approximations
and we knew them
almost a century ago.
We knew how to further reduce
the systems of equations of algebra
and how to reduce them
to an equivalent set of
floating-point arithmetical operations
and we knew them
over half a century ago.
We had been executing
those floating-point arithmetical operations
since 1946,
the year the first digital, programmable
supercomputer
was invented.
We knew the land before
parallel processing
as the land where we computed
one thing **at a time**.

The Land After Sequential Processing

In the 1980s, we did not know
the land after sequential processing,
or computing many things
at once.
What made the news headlines
in 1989
was that I did something
that was considered impossible
to do, namely, I crossed from
the land of sequential processing
to the land of parallel processing.
What made the news headlines
was that I experimentally discovered
how to solve
the most computation-intensive problems
of extreme-scale computational physics.
Solving the grand challenge problem
of computational physics
sharpened and **deepened**
our understanding of both the computer
and the supercomputer,

and changed the way we look
at both technologies.
I arrived at that unknown world
by forging a path
never taken before.
I arrived from a narrow footpath
that was never taken before.
I arrived at the *terra incognita*
of supercomputing knowledge
and arrived
holding a small lantern
that was dimly lit.

Thirty Thousand Years in One Day

The modern supercomputer
that computes **faster**
by massively parallel processing **across**
millions of processors
is the **fastest** computer in the world.
The massively parallel processing
supercomputer

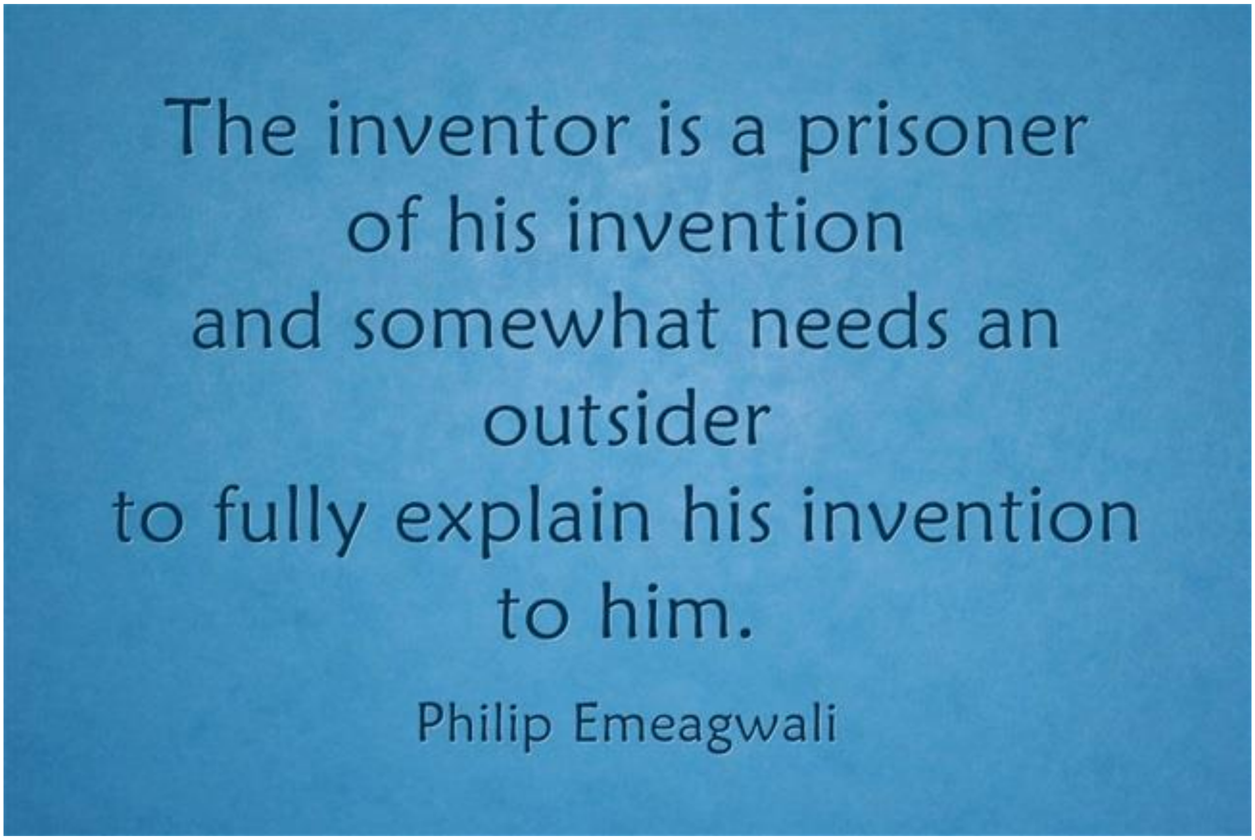
became the world's **fastest** computer
by computing many things
at once,
instead of computing only one thing
at a time.
The modern supercomputer
that solves millions of problems
at once,
instead of solving only one problem
at a time
helps make the world
a more knowledgeable place.
The modern supercomputer
that reduced **time-to-solution**
from thirty thousand [30,000] years
to just one day
increased our understanding
of our universe.
My discovery
of how to reduce **time-to-solution**
and how to reduce it

from 180 years to just one day
opened the door
to the modern supercomputer
that inspired the reduction
of **time-to-solution**
from thirty thousand [30,000] years
to just one day.

Please Allow Me to Introduce Myself

Please allow me to introduce myself.
I'm **Philip Emeagwali**.
The inventor is a prisoner
of his invention
and somewhat need an outsider
to fully explain his invention

to him.



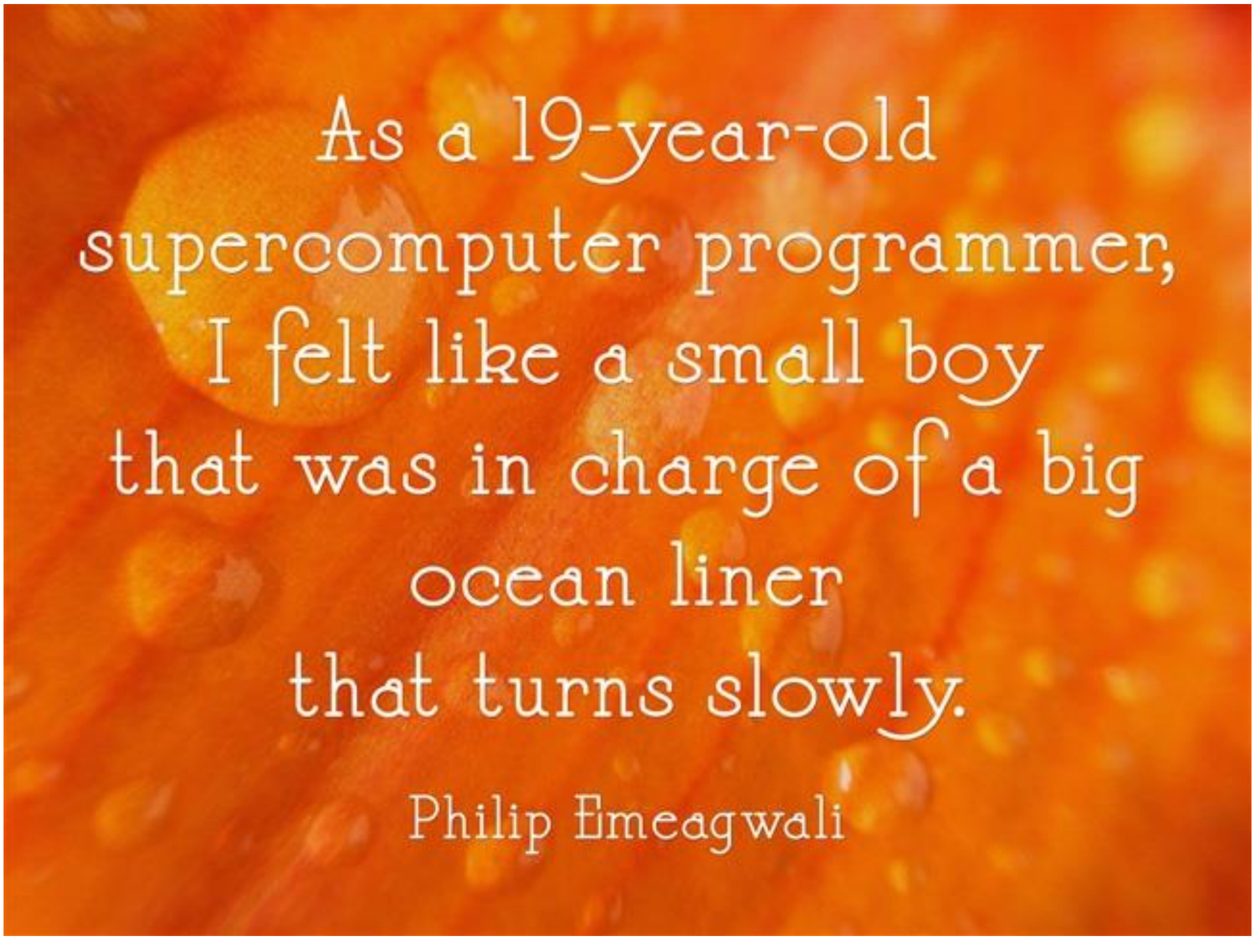
Yet, allow me to introduce myself.
I'm a supercomputer scientist.

My Origin Story

A story in the June 14, 1976 issue of the **Computer World** magazine was titled:

[quote]
"Research in Parallel Processing
Questioned as 'Waste of Time'."
[unquote]

Two years earlier,
I began programming supercomputers
and began on Thursday June 20, 1974
at age 19.
I began supercomputing
with one of the world's **fastest**
supercomputers
that was at 1800 SW Campus Way,
Corvallis, Oregon, United States.
That supercomputer
was the first to be rated
at one million instructions per second.
As a 19-year-old supercomputer
programmer,
I felt like a small boy
that was in charge of a big ocean liner
that turns slowly.

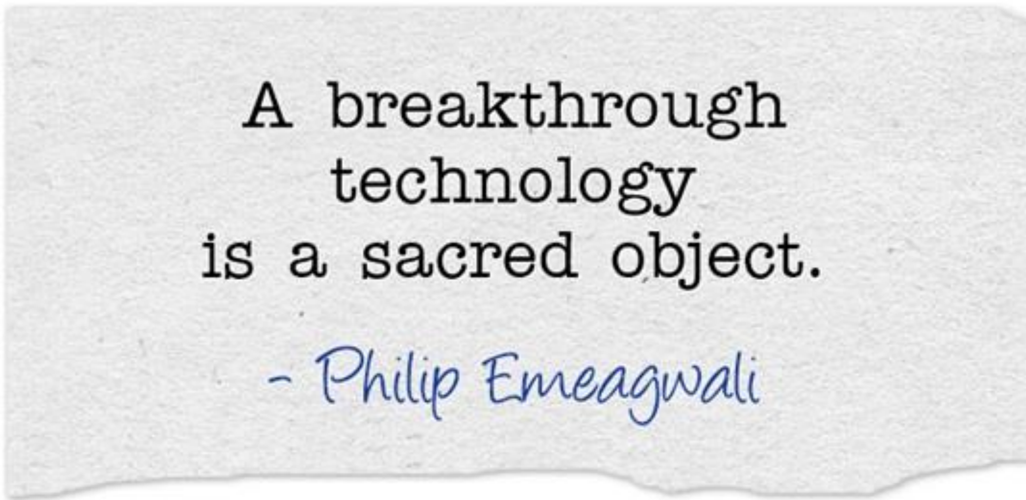


Three weeks after I began programming supercomputers,
I was on the cover of a newspaper
that circulated in the cities of
Monmouth and Independence, Oregon.
I became a local celebrity.

My Growth as a Supercomputer Scientist

Over the years, I realized that

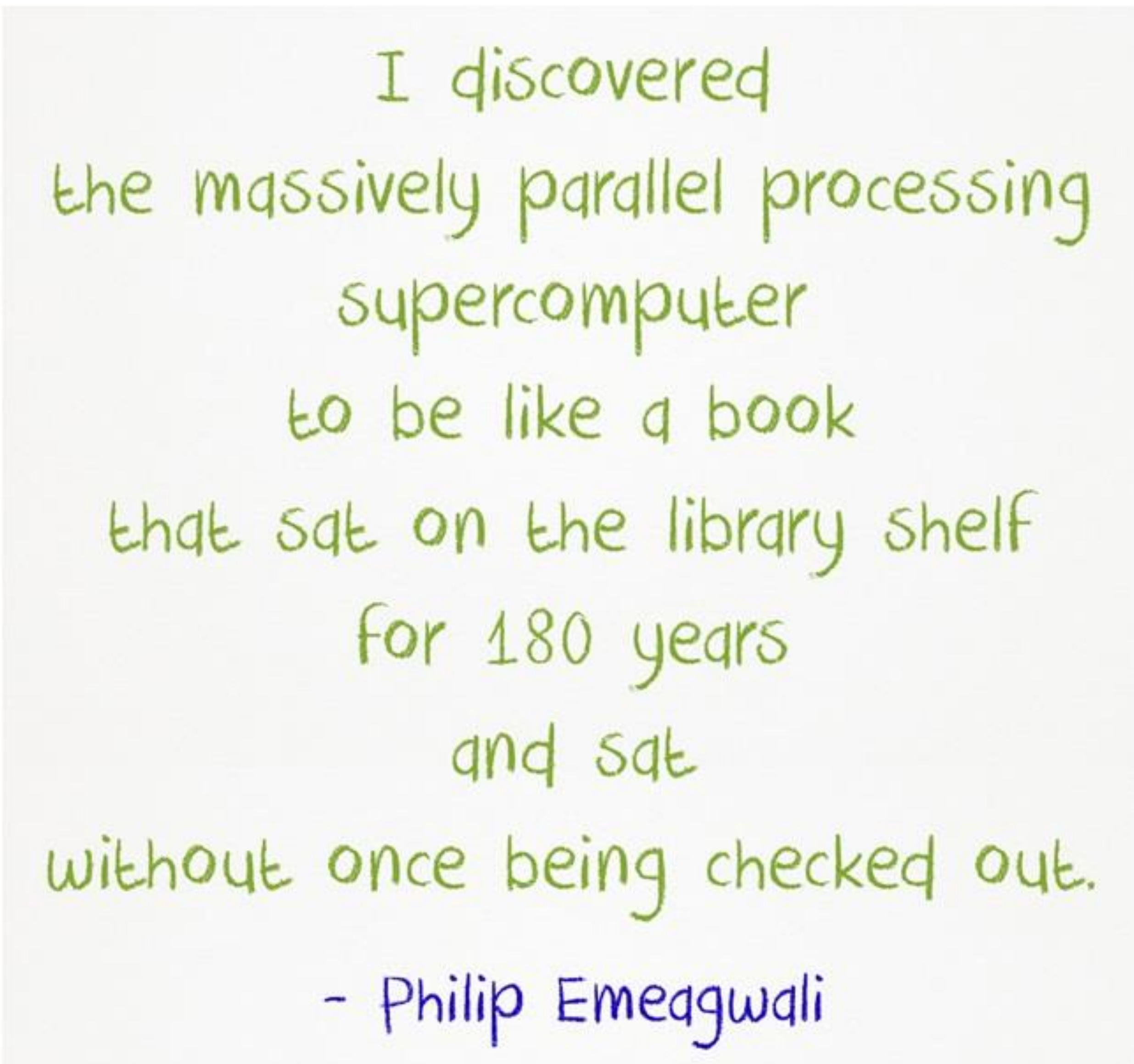
in Africa, a breakthrough technology is a sacred object.



The African that invents
a groundbreaking technology
can occupy the position
between **Albert Einstein**
and **Nelson Mandela**
and occupy that position
in the minds of Africans
at home and in the diaspora.
That African inventor
is invited to seat
on the African high table.
The invention of the fastest supercomputer
is a concrete and visible achievement
that everybody understands

as pushing the frontier of technology
as well as the boundary
of human knowledge.
None of the 25,000
vector processing supercomputer
programmers
of the 1980s
showed the massively parallel processing
supercomputer some love.
In the 1970s and '80s,
the *terra incognita*
that was the emerging field of
massively parallel processing
supercomputing
was as empty as a ghost town
that had only one permanent resident.
I—**Philip Emeagwali**—
was that permanent resident
of the farthest frontier of supercomputing
called massively parallel processing.
In the 1980s, **I discovered**
the massively parallel processing
supercomputer

to be like a book
that sat on the library shelf
for 180 years
and sat
without once being checked out.



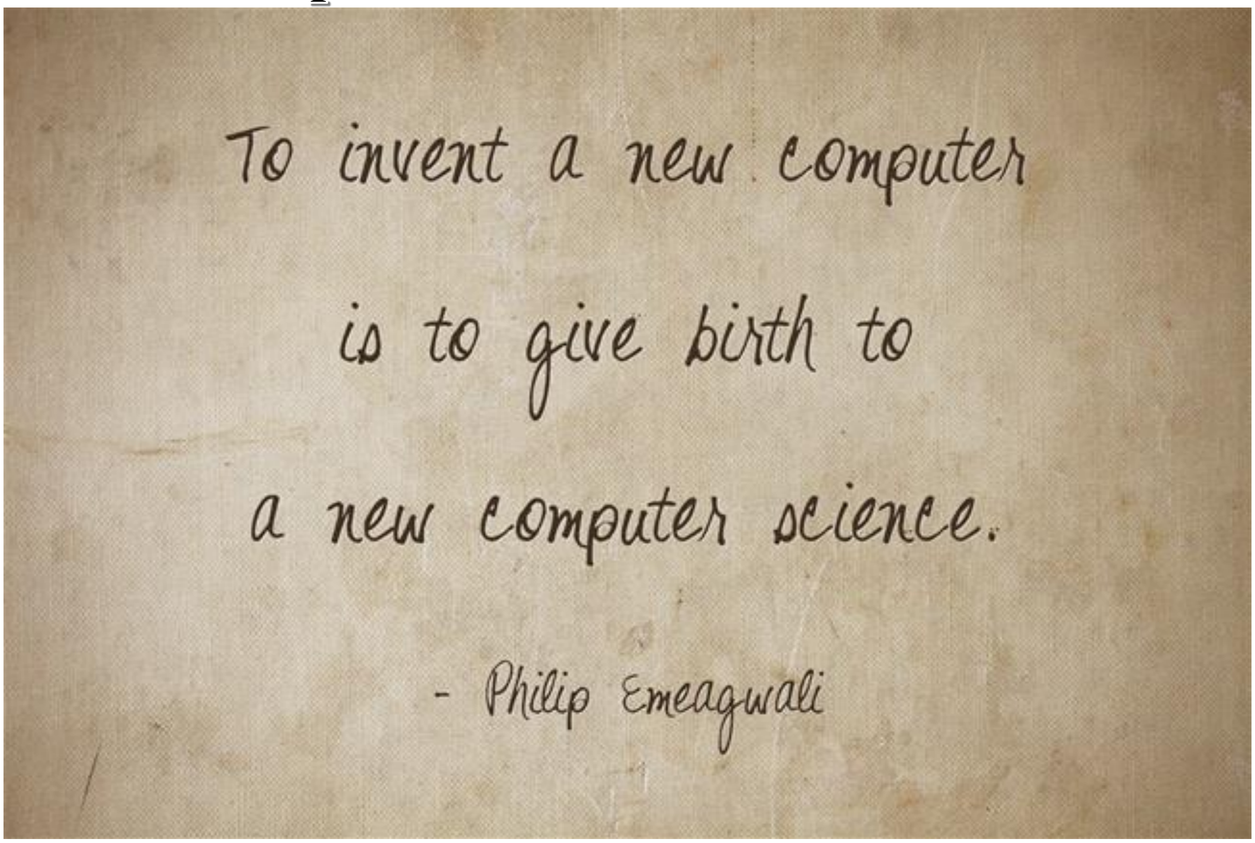
I was the only fulltime programmer
of the most massively parallel processing supercomputer
of the 1980s.
I visualized that massively
parallel processing supercomputer
as a small copy of the Internet.

My Struggles as a Supercomputer Scientist

The reason my experimental discovery
made the news headlines
was that for the four decades
onward of 1946
the parallel processing machine
was a supercomputer-hopeful
that no supercomputer scientist
understood
what made it super.
The new supercomputer
that I experimentally discovered
on the Fourth of July of 1989, in turn,
gave birth to

the new field of computational science.

To invent a new computer
is to give birth to
a new computer science.



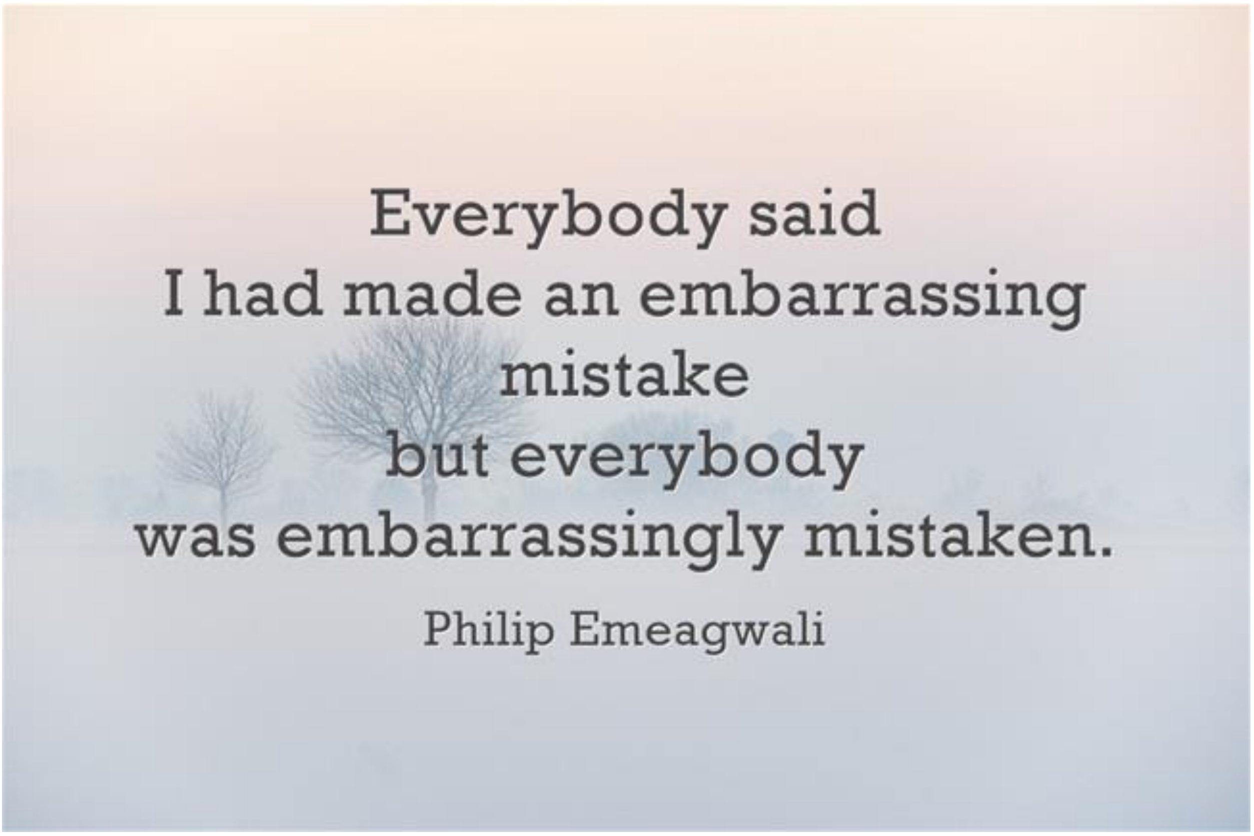
Biggest Advance Since Newton, Galileo

The May 8, 1987 issue
of *The Chronicle of Higher Education,*
carried an article that was titled:
[quote]
"Some Hail 'Computational Science'

as Biggest Advance Since Newton, Galileo."
[unquote]
Fast forward three years,
the June 27, 1990 issue of
The Chronicle of Higher Education
carried an article that proclaimed
that I—**Philip Emeagwali**—
had made the biggest advance
in computational science.
Back in 1989,
one of the science news headlines
was that an African Supercomputer Wizard
in the United States
had experimentally discovered
how and why parallel processing
makes computers **faster**
and makes supercomputers **fastest**
and invented
how and why to use
that **new supercomputer knowledge**
to build a **new supercomputer**
that encircled a globe
and encircled it

in the manner
the internet encircled a globe.
I am that African supercomputer scientist
that was in the news
back in 1989.
I was in the news
for experimentally discovering
across a new internet
and at 8:15 in the morning
in Los Alamos, New Mexico, United States
Tuesday the Fourth of July of 1989,
the US Independence Day,
and for experimentally discovering that
parallel processing
is an entirely new way of supercomputing
across thousands or millions or billions
of commodity-off-the-shelf processors.
At first, my experimental discovery
of the massively parallel processing
supercomputer
was ridiculed, mocked, and rejected.

Everybody said
I had made an embarrassing mistake
but everybody
was embarrassingly mistaken.



I was in the news
because I experimentally discovered
how to synchronously communicate
and how to simultaneously compute
and how to communicate
and compute **together**

and how to do both
as one seamless, cohesive unit.
That cohesive unit
was my new supercomputer *de facto*.
That cohesive unit
was defined around
a sixteen-dimensional hyperball
that is a new internet, by definition.
That cohesive unit
was a supercomputing machinery
that I used to **send** and **receive** emails
to and from
65,536, or two-to-power sixteen
sixteen-bit long
email addresses.
It's not enough that I know the
Philip Emeagwali internet.
That new internet
must know **Philip Emeagwali**
as its sole programmer.

Visualizing a Small Copy of the Internet

That global network of
64 binary thousand
commodity-off-the-shelf processors
that I experimentally discovered
that it could be programmed
to solve the toughest problems
in computational physics
was a new **internet**.
That new internet
was a small copy
of a never-before-understood Internet,
that had only 65,536 processors
around a globe
instead of billions of computers
around a globe.
I visualized each of my
two-to-power sixteen
commodity processors
as equal distances **afar** and **apart**
from each other

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 universe.
I visualized my ensemble
of processors
as outlining a new internet
that I visualized
in my sixteen-dimensional universe.
My new internet married
my 64 binary thousand processors
and married them **together**
and married them
as one seamless, cohesive supercomputer
that had one processor
at the **crossroad**
of my sixteen email pathways.
Those sixteen pathways

were mutually orthogonal to each other
in the sixteenth-dimensional hyperspace.
That is, they were perpendicular
in the sixteen directions
of an imaginary
sixteen dimensional universe.

Philip Emeagwali's Discoveries

I experimentally discovered
how to speed up computations **across**
that new internet
and speed it up from
one hundred and eighty [180] years,
or sixty-five thousand
five hundred and thirty-six [65,536] days,
within only one processor
to just one day
across that new internet
that's a global network of
sixty-five thousand

five hundred and thirty-six [65,536]
processors.
I experimentally discovered
my new massively parallel processing
supercomputer
and I did so by visualizing
my email messages
as firing like bullets **out of my eyes**
and as emails coming from computers
within a new internet
in a sixteen dimensional hyperspace.

How I Invented a New Internet

I'm **Philip Emeagwali**.
I'm the subject of school reports
because I invented
a new supercomputer
that was the precursor
to the modern supercomputer.
I invented a new supercomputer

that is a small copy
of a new internet.
The new internet that I invented
is defined and outlined by an ensemble
of 65,536
commodity-off-the-shelf processors
that are identical to each other
and that are equal distances
afar and **apart** from each other.
That new internet
is complex, abstract, and a mystery.
The **65,536** processors of my new internet
were married together
by **1,048,576** bi-directional email wires
and married together
as a new supercomputer
that computed cohesively
and did so as one new integrated
supercomputer
and communicated seamlessly
as one new internet.

I began supercomputing at age 19
on June 20, 1974
in Corvallis, Oregon, United States.
I was the lone wolf
and the only full time programmer
of the fastest supercomputer
of the 1980s.

The Holy Grail of Supercomputing

Today, the fastest supercomputer
costs the budget of a small nation.
The fastest supercomputer
is programmed by thousands
of supercomputer scientists.
The fastest supercomputer
occupies the space of a soccer field.
The **Holy Grail** of the fastest possible
supercomputer
is to marry together

all the processors in the world
and marry them
to all the computers in the world
and marry them
to all the supercomputers
in the world
and marry processors and computers
and supercomputers together
and as a never-before-seen internet
that will become a never-before-seen
planetary-sized supercomputer
that will turn our science fiction
to our descendant's non-fiction.

Changing the Way We Look at Computers

I'm **Philip Emeagwali**.
I discovered the paradigm
in which the boundary
between the computer and the internet

is blurred.
When I began supercomputing
—on June 20, 1974—I envisioned
a planet-sized global
network of computers
that was the precursor
to the Internet.
In subsequent years, I invented
a new internet
that I called a HyperBall
that was described in the book titled:
"History of the Internet."
I, Philip Emeagwali,
experimentally discovered
that my ensemble of processors
defined and **outlined**
a new internet
that I visualized
as my small copy
or **blueprint** or **prototype**

of the Internet.
Prior to my experimental discovery
of the massively parallel processing
supercomputer
that I discovered
on the Fourth of July of 1989,
each processor within my ensemble
of 64 binary thousand processors
was like a dim light
in a sea of darkness.
On the Fourth of July of 1989,
I experimentally discovered that
when processors are computing together
and doing so as one seamless, cohesive
supercomputer,
then my sixty-five thousand
five hundred and thirty-six [65,536]
processors
became as bright as the sun.

I was in the news headlines
because I brought a new face,
a new voice, and a new vision
to the story of the development
of the modern supercomputer
that is not a computer *per se*
but that is a new internet *de facto*.
I also invented a second new internet
that I called a Cosmic Ball.
In the mid-1970s, my new internets
remained science fiction.
But on the Fourth of July of 1989,
I constructively reduced
that HyperBall science fiction
to **nonfiction**
and I did so
when I became the first person
to experimentally discover that
an ensemble of the slowest
65,536 processors

in the world
can be harnessed to compute faster than
the fastest supercomputer
in the world
and do so while solving
the toughest problems
in extreme-scale computational physics.

Contributions of Philip Emeagwali to Physics

I was in the news
in 1989
because I experimentally discovered
how to reduce the performance abyss
between the sequential
or the vector processing supercomputer
and the massively parallel processing
supercomputer.
I did not experimentally discover
the technology
of the massively parallel processing

supercomputer
and invented that technology
by inventing how to **tweak**
the sequential processing codes
that arose in extreme-scale
computational mathematics.
Nor did I constructively reduce to practice,
or experimentally invent,
the new supercomputer
and did so by inventing how to **vectorize**
the vector processing codes
that arose in extreme-scale
computational physics.
I discovered
the parallel processing supercomputer
from first principles,
from the laws of physics,
from the partial **differential** equations
of calculus,
and from the partial **difference** equations
of algebra.
In the early 1980s, I invented
nine partial differential equations

of modern calculus
that fit the second law of motion
of physics,
rather than invent
a law of motion of physics
that fit the partial differential equations
on the mathematician's blackboard
and in the calculus textbook.
Mathematics is not a science
in its own right.
The new calculus that I invented—namely,
the nine system of
partial differential equations
called Emeagwali's Equations—
is the **middle science** that mediates between
the mind of man
and the motion of objects.
It is that **intermediary position**
of my new calculus
that prompted the debate
on whether new mathematics is discovered
or invented.
I see the nine Emeagwali's Equations

as inventions
that were abstracted from
the discovery
of the Second Law of Motion of physics
that occurred 330 years ago.
The physical law
that I encoded into Emeagwali's Equations
existed 13.82 billion years ago
—when the universe was born
from the Big Bang explosion—
but the mathematical terms
that codified those laws
could have been known 13.82 billion years
ago but were not known then.

Contributions of Philip Emeagwali to Computational Physics

The nine new partial differential equations
that I invented
were beings of reason
but what they simulated were real beings.

The reason I make this distinction
between beings of reason
and real beings
is because I am often asked:
"Did you discover or invent
Emeagwali's Equations?"
My answer is that I discovered
the **Emeagwali's Equations**
if my partial differential equations existed
in textbooks on modern calculus
and that I invented
the **Emeagwali's Equations**
if my partial differential equations
did not previously exist
in calculus textbooks.
In computational physics,
extreme-scale algebra
is the recurring decimal
and the elephant in the room.
Algebra
that arose from the
partial differential equation

is the way the supercomputer
experience calculus.

Contributions of Philip Emeagwali to the Modern Supercomputer

Those experimental discoveries
of how to massively parallel process
across an ensemble of processors
enabled me to forge a path
to the farthest frontier of computing
that is the modern supercomputer.
What made the news headlines
in 1989
was that I experimentally discovered
the technology of the massively
parallel processing supercomputer
and that I constructively reduced
the technology to practice
and I did so on the Fourth of July of 1989

when supercomputer textbooks
considered computing many things **at once**
to be **impossible**
and I did so in 1989
when all the 25,000
supercomputer scientists
in the world
considered it to be impossible
to parallel process
the most extreme-scale problems
arising in computational physics—such as
general circulation modeling
to foresee otherwise unforeseeable
climate changes.

Making the Impossible Possible

The June 14, 1976 issue
of the *Computer World* magazine
reported on a special session
on parallel processing

that occurred at the
National Computer Conference.
The *Computer World* magazine reported that
a panelist of supercomputer experts
at that National Computer Conference
were of the opinion that
[I quote]:
"Those machines
often turn out to be large and clumsy,
and several of the large
parallel processor designs
since then **have failed**.
Now we are moving into the modern era."
[End of quote]
Back in 1974,
massively parallel processing
supercomputer coding
was like rubbing rocks
until they caught fire.
Sometimes, it is difficult
to translate thoughts
from one medium to another.

The article is written to be read
on a page
but the algorithm is invented to be coded
on a processor.
And trying to explain
my abstract supercomputer algorithms
is like trying to rub rocks
until they catch fire.
I began supercomputing
eighteen months after the last man
walked on the moon.
On June 20, 1974,
the day I began supercomputing,
it was easier to travel to the moon
than to travel to the frontier
of the massively parallel processing
supercomputer
that is the precursor
to the modern supercomputer.
In the 1970s and '80s,
to parallel process **across** a new internet

that was a global network of
64 binary thousand
commodity-off-the-shelf processors
was like walking alone
through a dark rain forest
and doing so alone
with only a dim lamp.
My quest for the massively
parallel processing supercomputer
was my attempt to discover
that the impossible is, in fact, possible.

Solving the Toughest Problem in Physics

Parallel processing
is defined as the technique
of fastest supercomputing
that is fastest
by computing many things
at once, or in parallel,
instead of computing only one thing

at a time, or in sequence.
To the supercomputer scientist
of 1989 and earlier,
to invent parallel processing
was to experimentally discover that
massively parallel processing
the toughest problems
in extreme-scale computational physics
is not a waste of time.
I was in the news in 1989
because I experimentally discovered
how to save time
and how to do so by reducing
65,536 days, or 180 years,
of time-to-solution on one processor
that is not a member of an ensemble
of processors
and reducing that **time-to-solution**
to only one day of **time-to-solution**
across
an ensemble of 65,536 processors

that were the building blocks
of a new supercomputer.
My experimental discovery
was recognized in the June 20, 1990 issue
of *The Wall Street Journal*.

Changing the Way We Look at the Computer

The *Wall Street Journal*
reported that my experimental discovery
of the massively parallel processing
supercomputer

will change the way
we look at the supercomputer.
In the old way, we thought about
a conventional supercomputer
as powered by one strong ox.
That strong ox
was a metaphor for one **powerful** processor.
In the new way, we think about
a modern supercomputer

as powered by sixty-five thousand
five hundred and thirty-six [65,536]
chickens.
Those chickens were my metaphors
for sixty-five thousand
five hundred and thirty-six [65,536]
weak processors.

Recognition From President Bill Clinton

Eleven years later,
that experimental discovery
of a new internet
that is also a new supercomputer
was reconfirmed
by supercomputer scientists
to then President Bill Clinton
and reconfirmed
in his White House speech
of August 26, 2000.
That speech of President Bill Clinton
was delivered
to the **Nigerian parliament**

in Abuja, Nigeria.
My contribution
to the development of the computer
is the subject of school reports because
I discovered that
the impossible-to-compute is, in fact,
possible-to-compute.
My technological quest
was for a new supercomputer
that is a new internet
that is defined and outlined
by a new global network of
65,536 commodity processors.
My technological quest
was for the fastest supercomputer
and for how to reduce
65,536 days, or 180 years,
of **time-to-solution**
on only one processor
that is not a member
of an ensemble of processors
and how to reduce

that **time-to-solution**
to just one day of **time-to-solution**
across a new supercomputer
that is a new internet
and that is defined
as a new global network of
65,536 processors.

Bullets Out of My Eyes

I visualized my sixteen times
two-to-power-sixteen email wires
as pieces of fire woods
that connected
my two-to-power sixteen processors
that each contained **kerosene**.
My scientific quest
was to experimentally discover
the new knowledge,
or the intellectual spark,
that will set my new internet
on fire.

As the lone wolf
massively parallel processing
supercomputer scientist
of the 1980s,
it was imperative that I know
how my ensemble
of 64 binary thousand processors
were married together
by my ensemble
of one binary million email wires
and married together
as one seamless, cohesive supercomputer
that is not a computer *per se*
but that is a new internet *de facto*
and that I know that new
global network
both forward and backward.
That new knowledge
was not known
to any of the 25,000 vector processing
supercomputer scientists
of the 1980s.
That new knowledge

was the reason
I could set my new supercomputer
on fire.
For me, 1989
was the year of fire,
the year the massively parallel processing
supercomputer
became the fire
the supercomputer scientist
can't put out.
The 65,536 simultaneously sent
and synchronously received
email messages
were like bullets out of my eyes.

Searching for a Black Box in a Dark Room

My journey to the farthest frontier
of technological knowledge
and my quest for the fastest supercomputer
that is a new internet
was a mathematical journey
from fiction to fact to forecast.

A theory
is an idea that's not positively true.
Prior to my experimental discovery
of the Fourth of July of 1989
the mechanism
by which 64 binary thousand
computational physics codes
were synchronously emailed
to as many processors
remained unknown
and remained a theory
that was not positively true.
My experimental discovery
of the Fourth of July of 1989
put to rest the saying that
parallel processing
is a beautiful theory
that lacked experimental confirmation.
Prior to my 1989 experimental discovery,
parallel processing was widely caricatured
and rejected

as a huge waste of everybody's time.
Back in the 1970s and '80s,
parallel processing was ridiculed
as a beautiful theory
that lacks experimental confirmation.
And my quest for the fastest
massively parallel processing computation
was like searching for a black box
in a dark sixteen-dimensional universe.

Searching for a New Supercomputer

Looking back from June 20, 1974,
in Corvallis, Oregon, United States,
my lone search
for what makes computers **faster**
and for what makes supercomputers **fastest**
was like going into the **Sambisa** forest
of Northern Nigeria
alone
and to search for the elusive **Chibok** girls
that were held hostage

by **Boko Haram** fighters.
Parallel processing
was the Holy Grail
and the **Chibok** girls of supercomputing.
Searching for the fastest
parallel processing supercomputer
was like walking at night
and along an uncharted road
in the **Sambisa** forest of Northern Nigeria
and doing so armed against
Boko Haram fighters
with only a **small lantern**.
My quest was for new knowledge,
new algebra, new calculus,
and new computational physics.
My quest was also for
a new computer science
that must arise from a new supercomputer
that is a new internet
and that is a new supercomputer *de facto*.
I experimentally discovered
that the impossible-to-compute

is, in fact, possible-to-compute.
On June 20, 1974, and at age 19,
I was like a mouse
that was inside the supercomputer
that was at 1800 SW Campus Way,
Corvallis, Oregon, United States.
For the next decade and half,
I grew to the 34-year-old lion
that was protecting
the world's fastest supercomputer.

A Father of the Internet

Although the internet
has many fathers and mothers,
uncles and aunts,
I am the only father
of the Internet
that invented a new internet.
I visualized the fastest calculations
across a new internet

before I **experimentally discovered**
the fastest calculations
across my new global network of
64 binary thousand
commodity processors,
or **across** as many tiny, identical
computers.
I visualized my new internet
in a fictional sixteen-dimensional
universe
but I experimentally discovered
my new supercomputer
in our factual three-dimensional
universe.
Fast computation defines
the computer.
Recording a **never-before-recorded** speed
in computation
redefines the supercomputer

and redefines the boundary
of human knowledge.
The fastest computation
is the most objective
and the most measurable contribution
to the development of the computer.
The supercomputer speedup
—of from **one day** to **180** years—
that I experimentally discovered
on the Fourth of July of 1989
made the news headlines because
it was quantum, instead of incremental,
increase in the speed of computation.
That experimental discovery
was also a paradigm shift in thinking,
instead of an evolutionary shift in thinking.
As reported in the news media,
such as the June 20, 1990 issue

of *The Wall Street Journal*,
my experimental discovery
of the massively parallel processing
supercomputer
was not in the new fastest supercomputer.
My **experimental discovery**
was in discovering
a new way of thinking about
the new fastest supercomputer
and thinking about the supercomputer
of tomorrow
not as a computer *per se*
but as a global network of
processors
that is a new internet *de facto*.
My **experimental discovery**
of massively parallel processing
was independent of processor technology

and was a blueprint for a new internet.
The experimental discovery
of a faster supercomputer
is a historical milestone
that measures human progress.
The reason the experimental discovery
of how to compute faster
—and how to do so
by changing the way we look at
the modern supercomputer—
is a marker of progress
is that it's a discovery
that makes the **impossible-to-compute**
possible-to-compute.
The experimental discovery
of the massively
parallel processing supercomputer
proves that humanity is progressing
in the right direction.