



Distributed Systems and GRID Computing

Author: Reisel González Pérez

University of the Informatic Sciences
Havana- Cuba

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Summary

1. Computer from the beginnings.
2. Challenges.
3. High Performance Computing.
4. Distributed Systems.



Computer from the beginnings

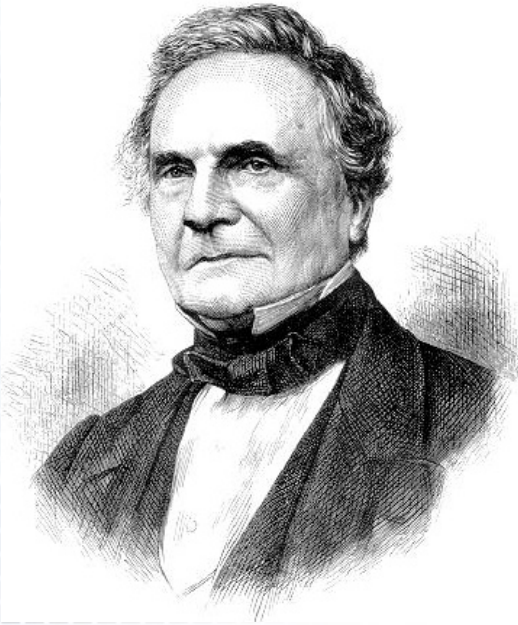
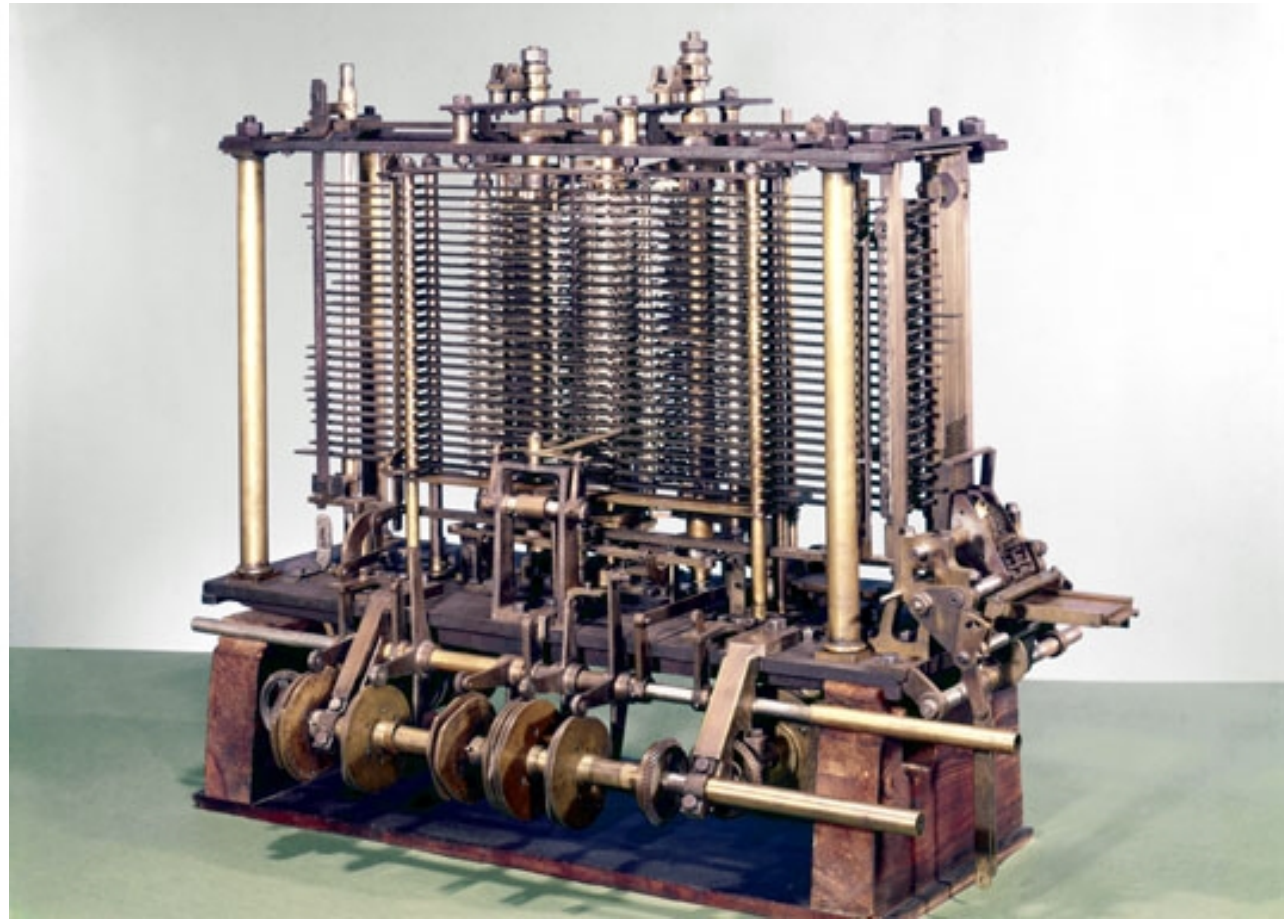


History



The Legendary Chinese Abaco

History



The first true “digital computer” was designed by the English mathematician Charles Babbage - “Difference Engine”



Today



With the invention of the microchip computers became more powerful and essential to the development of science and life in general...

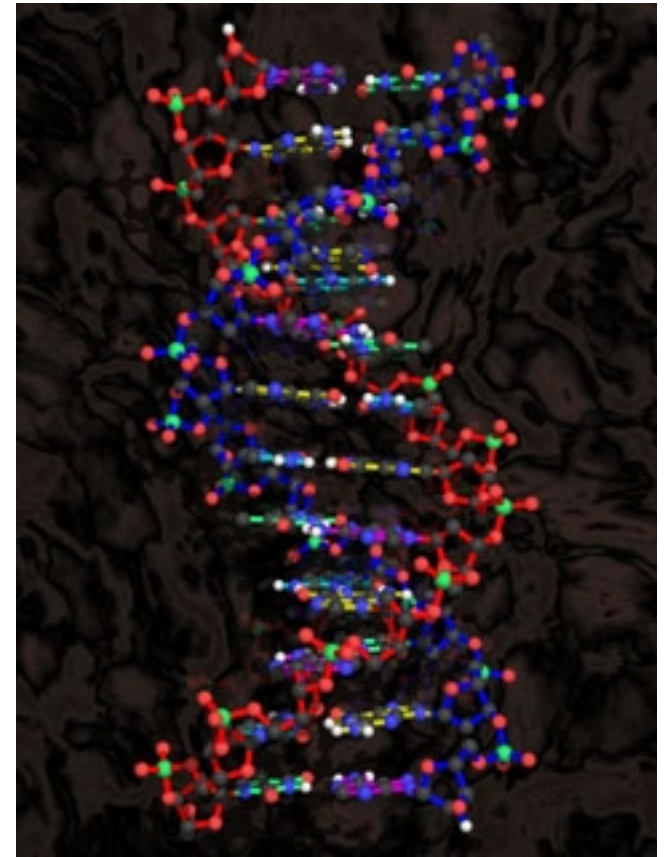
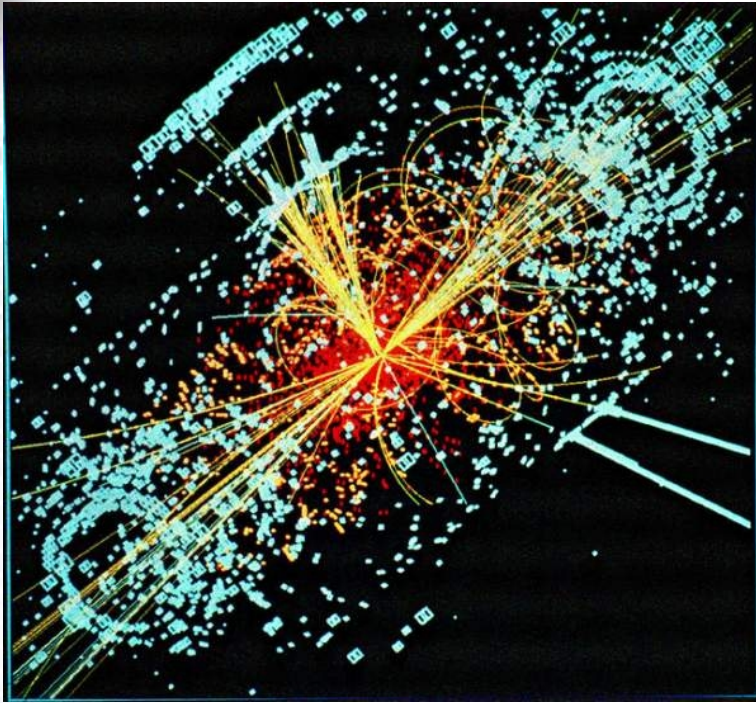


Actually exist computing power to
solve major problems and
challenges of science...





Challenges





Large Hadron Collider (LHC)



This project is expected to generate more than
37 terabytes of data every day...

(1 TB = 1024 GB)

This information must be stored, analyzed and
processed by ***High Performance Computing***
(HPC) systems...



High Performance Computing



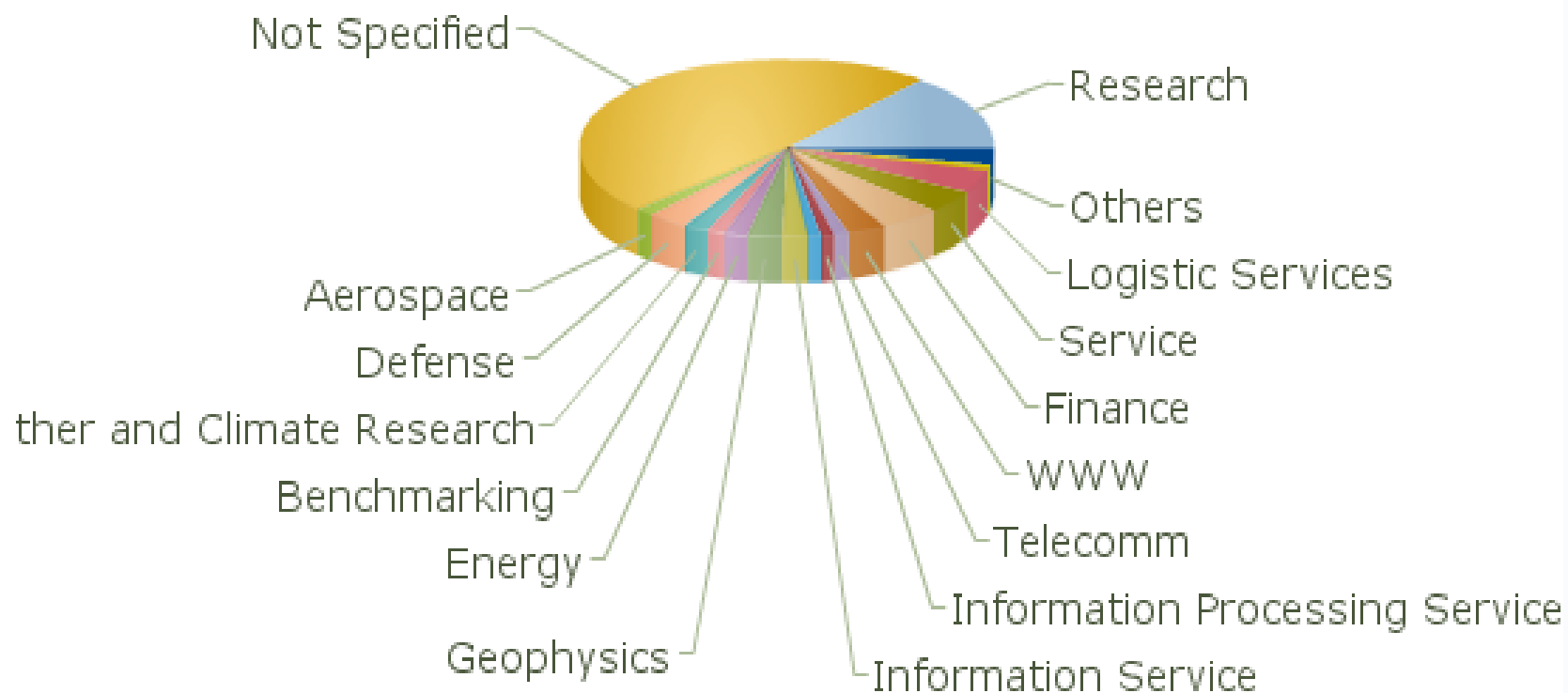
High Performance Computing

The high-performance computing is a very important tool in developing computer simulations to complex problems.

Based on computer technologies such as clusters, supercomputers, or using parallel computing.



HPC - Application Areas





Clustering

Cluster computers, Division of Physical Chemistry (CIGB) that stores and protects information from genes and proteins.

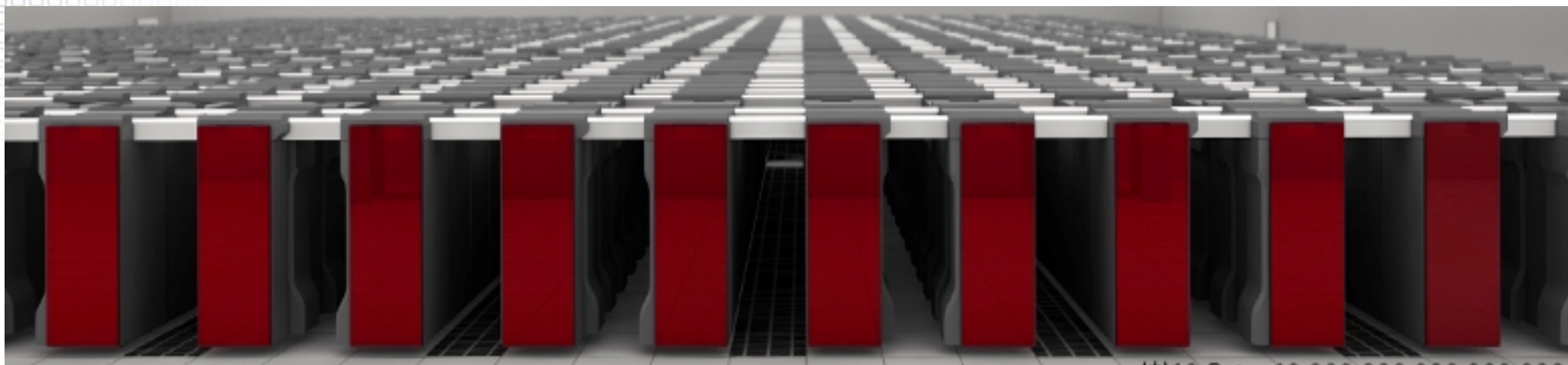
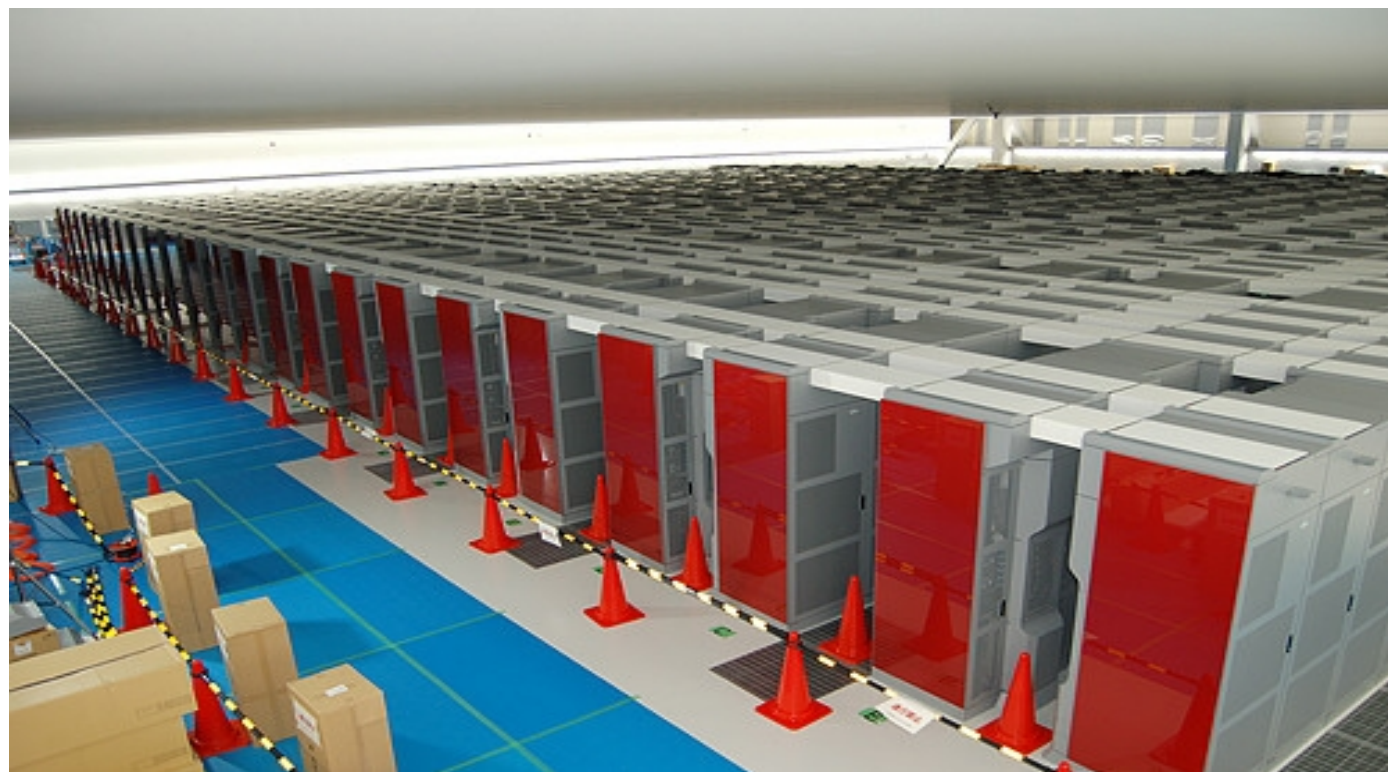


Cluster computers of the National Aeronautics and Space Administration (NASA), government agency responsible for space programs.





Most Powerful Supercomputer





HPC - Main Disadvantage

The main issue on HCP is the cost. Build or buy a supercomputer is very expensive.

The K Computer cost over ***\$1.25 billion US dollars.***



Distributed Systems and GRID Computing



Grid Computing

Distributed computing paradigm in which all the resources of any number of computers are subsumed to be treated as a ***Single Virtual Supercomputer***.



Objetives

Distributed computing and GRID Computing is designed to solve problems too big for any supercomputer or cluster.



Features

Distributed systems must be *scalable*,
transparent and fault-tolerant.



Terms

Scalability: *refers to the variability of the size of a distributed system.*

Transparency: *refers to the invisibility of the use of multiple processors and remote access.*

Fault Tolerance: *if a system component breaks another component must be able to replace.*



Advantages

1. Provides a mechanism for transparent collaboration between dispersed computer groups.
2. Enables the operation of large-scale applications.
3. Provides access to distributed resources from our computers.
4. All these objectives and benefits are included in the idea of "e-Science"



Main advantage

In a cluster all computers are in the same place, connected by a LAN, those are dedicated computers and must have the same hardware.

In contrast, in the GRID computers can be distributed around the world.



Major projects

1. Seti@home: radio signal processing to search for evidence of extraterrestrial intelligence.
2. Folding@home: simulating protein folding, primarily using molecular dynamics technique.
3. FightAIDS@home: using biomedical simulation techniques to look for ways to cure or prevent the spread of AIDS and HIV.
4. The Grid: process and store the information generated by the "Large Hadron Collider."



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Questions





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