

BOINC

Community Grid Computing

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159.735



Outline

- What is BOINC
- Challenges
- Successful Projects

What is BOINC

- Berkeley Open Infrastructure for Network Computing
- Middleware, allows volunteers to donate computing power to scientific research
- Uses spare cycles on people's home machines
- Helps science, involves public
- Enables projects not possible otherwise

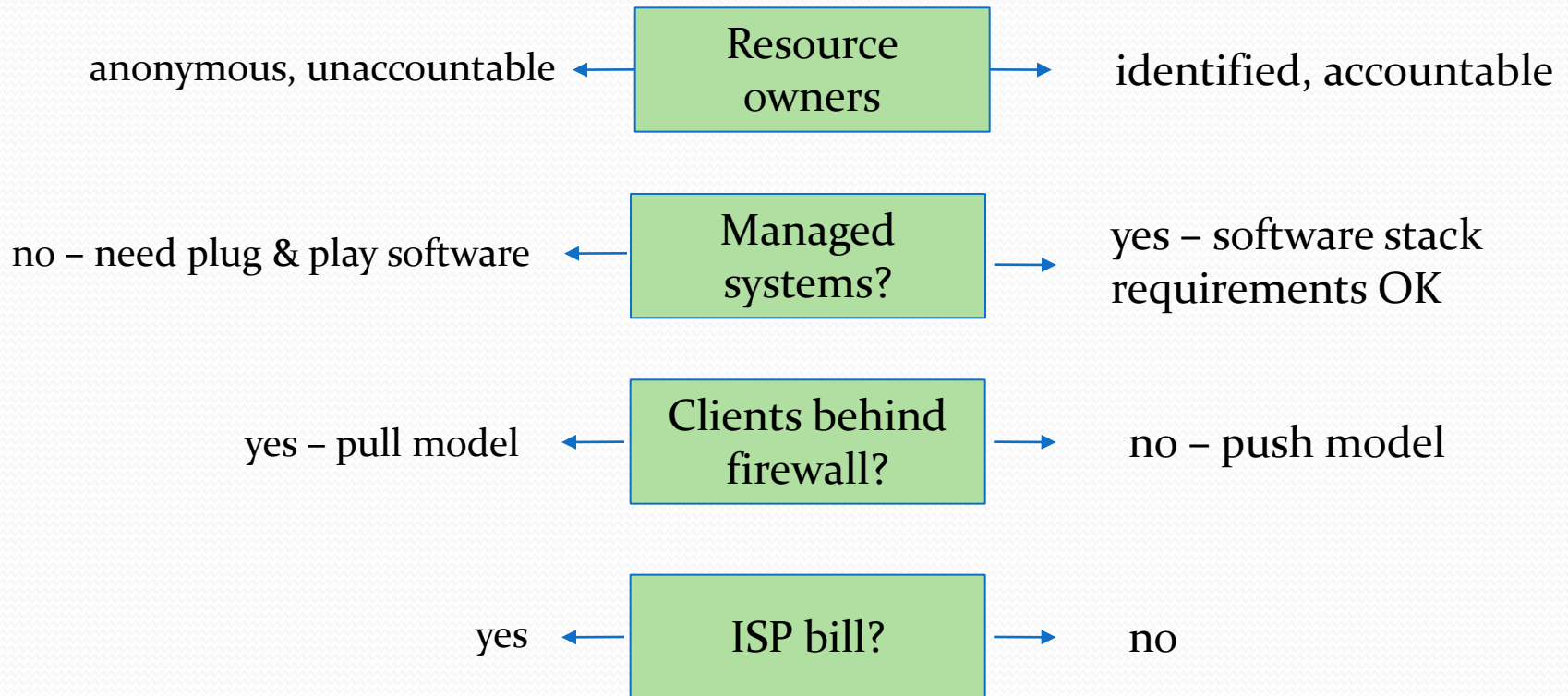
History

- GIMPS (1996)
- Distributed.net (1997)
- SETI@Home (1999)
- Folding@Home (2000)
- Business attempts failed
- BOINC (2002) - Open source (LGPL)

How it works

- Server breaks problem into smaller tasks
- Scheduler distributes tasks to clients over the Internet
- Client computes the task using idle CPU (and GPU!) cycles
- Client submits the result
- Server validates the result and credits the user

Volunteer computing != Grid computing



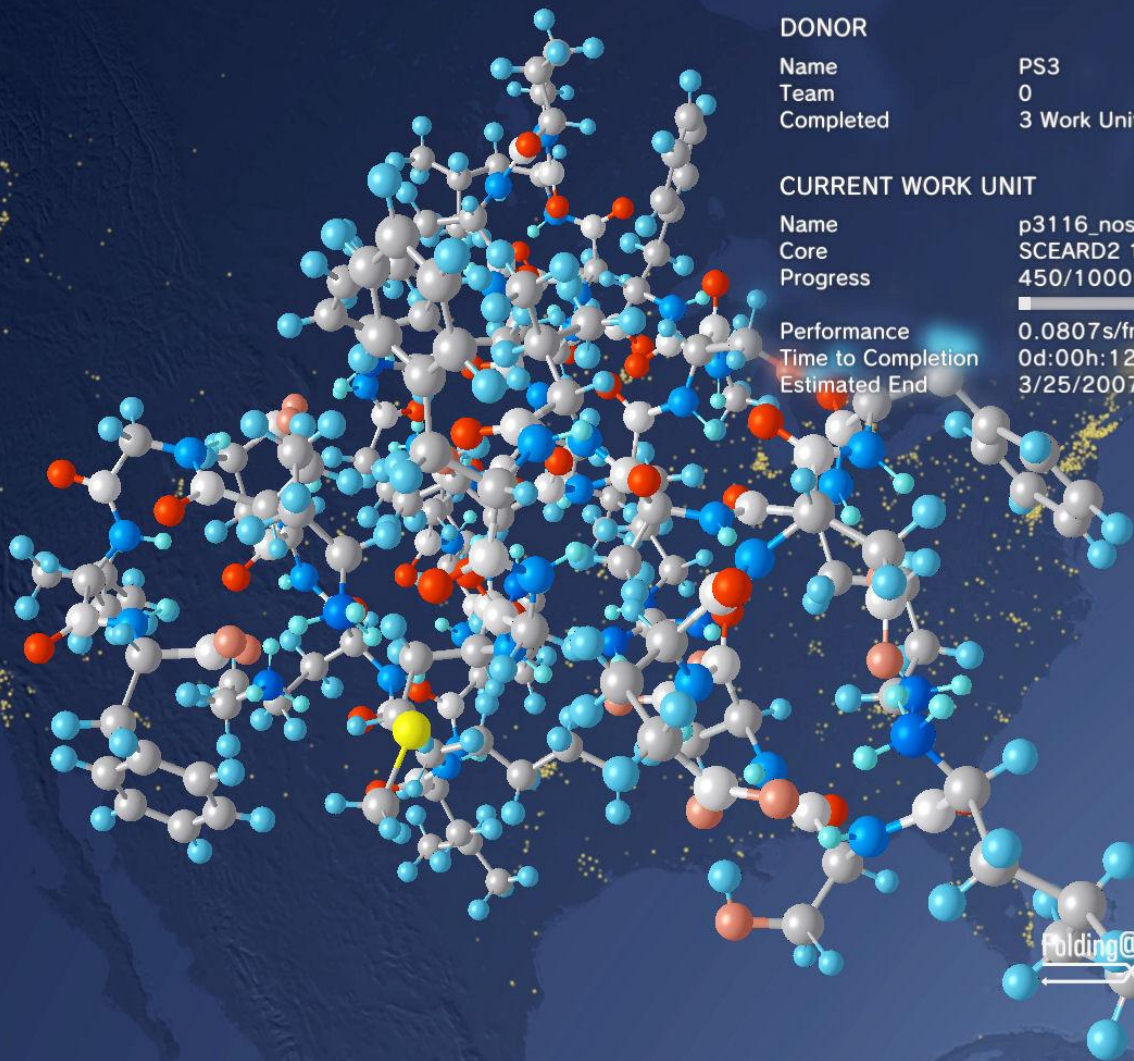
... nor is it “peer-to-peer computing”

Suitable Projects

- No peer communication
- Minimum server communication
- Many simple jobs
- Intensive computing
- High latency
- Grand challenge problems: weather modelling, DNA structures

Successful Projects


- Proteins – deduce DNA sequence, given a protein
- RenderFarm – publicly distributed 3D renderer
- MilkyWay – uses Digital Sky data to deduce structure of the galaxy
- ProjectSudoku – smallest possible start configuration
- Rosetta – to understand protein folding, misfolding, and related diseases
- <http://boinc.berkeley.edu/>



DONOR

Name	PS3
Team	0
Completed	3 Work Units

CURRENT WORK UNIT

Name	p3116_noshake_low
Core	SCEARD2 1.9.74885
Progress	450/10000
	 4.51%
Performance	0.0807s/frame 214.11 ns/day
Time to Completion	0d:00h:12m:51s
Estimated End	3/25/2007 Sun 12:28



MPI Comparison

- BOINC is not MPI compatible, however:
- Scatter, Gather, Barrier – equivalent possible
- AllToAll, Send, Recv – not possible
- Communication slow and costly
- Enormous number of processors
- The application does not know how many processors, nor own rank



Questions?

References

1. <http://boinc.berkeley.edu>
2. <http://folding.stanford.edu>
3. http://www.boinc-wiki.info/BOINC_System_Architecture
4. http://www.boinc-wiki.info/BOINC_System
5. <http://boinc.berkeley.edu/trac/wiki/ProjectMain>
6. http://en.wikipedia.org/wiki/Berkeley_Open_Infrastructure_for_Network_Computing