Dynamic resource allocation and accounting in a digital marketplace

Need statement

Overall demand for computing resources unmet due to explosion of AI/ML, Big Data, and research computing.

Commercial cloud is a large expense for enterprises, unaffordable for smaller researchers, and significant constraint on the pace of innovation.

Issues in cross-border provision of computing resources.

The Distributed.Computer

A web-based distributed computing framework with a built-in accounting system for cross-border and multi-agent resource consumption.

Individual institutions and federated infrastructures, such as EOSC and Compute Canada, can recapture and allocate underutilized resources via a credit-based accounting system that meters consumption of CPU, GPU, I/O and other such resources.

EOCS-DIH and CENGN pilot

EGI data centers in Italy (Catania) and France (Strasbourg), and CENGN data centers in Canada (Toronto, Ottawa, Waterloo) simultaneously ran the Distributed Computer worker agent.
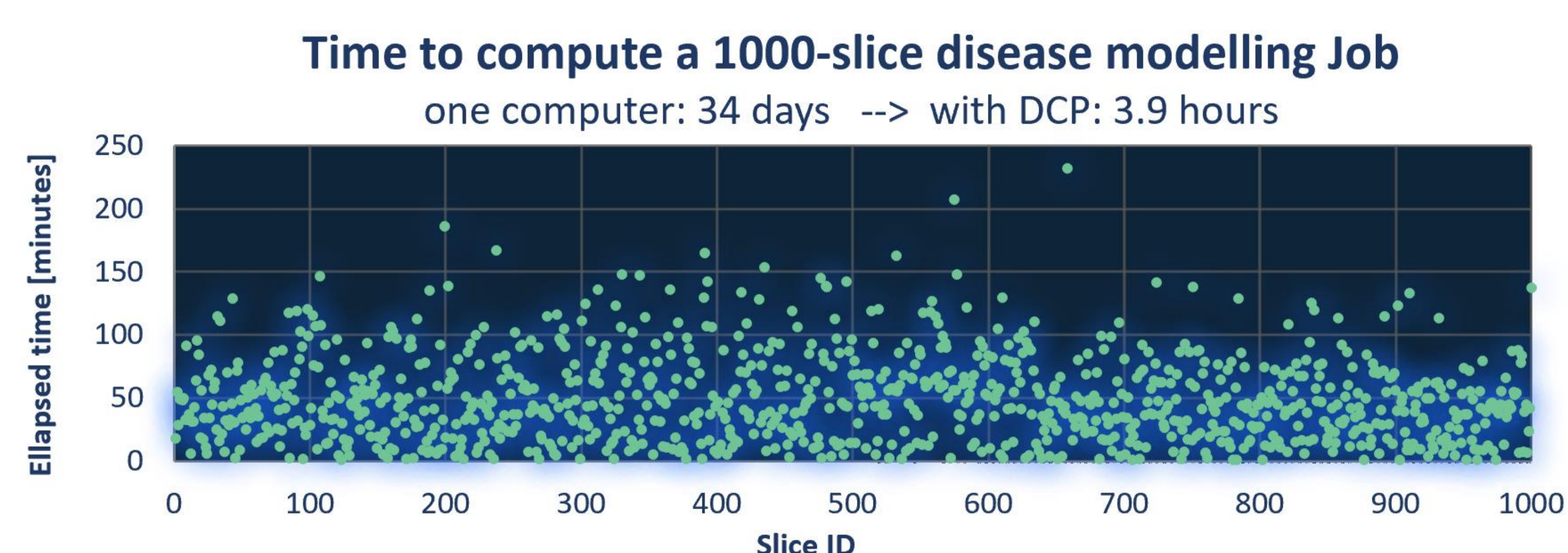
The workers accepted and executed research computing tasks (disease modelling and astrophysics), returned the results to the client application, and collected credits in their respective bank accounts.

Multi-metric accounting system

Computational workloads are dynamically characterized in terms of their consumption of CPU, GPU, I/O and other resources.

Credits are spent to deploy workloads.

Nodes earn credits when executing workloads.

Credit-based system for cross-border provision.

Distributed Computer Keystores

EOSC-DIH	CENGN
Address	Address
0xc0e67f55644545bbcfde2a 96dc7f561f91379426	0x079dac0612c710ab4e975d ab7171c7e4bef78c5a
Balance	Balance
707.983147739346404403	1566.189260623770441485
Escrow Balance	Escrow Balance
0.305943963192381156	0.000000000000000000

Pilot performance

A disease modeling job trajmatch.apps.distributed.computer/ that would have taken 34 days on a single computer only took 3.9 hrs using the Distributed Computer on EOSC and CENGN

Time to compute a 1000-slice disease modelling Job
one computer: 34 days --> with DCP: 3.9 hours

Demonstration

Client application:
dcp.mn/demo
Press COMPUTE to deploy

Worker nodes:
dcp.mn
Open on any number of devices and press START

More at:
portal.distributed.computer