

PROBLEM BACKGROUND

Climateprediction.net (CPDN) is a distributed initiative that aims to run thousands of different climate modeling simulations in order to research the uncertainties on parameters, which is needed to be able to understand how small variations in initial values can affect both models and results of simulated climate.

CPDN has been running for more than 10 years and nowadays it is facing a set of new different challenges:

- Growing and variable need for new resources, caused by the execution and outputs of new versions of the model (HadGEM) [2] and the processing of huge amount of results that are hard to manage with the current infrastructure that runs over the BOINC framework.
- Lack, and need, of more control over the workflow and its intermediate stages.
- Streamlining of the costs and budget. This is of special interest for research on-demand projects increasingly requested by external research collaborators and stakeholders.

GOALS

- **Conversion of the current Climateprediction.net (CPDN) infrastructure from BOINC to a Cloud Infrastructure as a Service (IaaS) for both computing and storage.**
- **Development and implementation of a Control Plane for this new Infrastructure. This system provides a simple (and high level) method to manage all the solution and includes metrics and statistics.**
- **Make everything with Free Software to comply with scientific reproducibility [1] and fully documented.**

PROPOSED SOLUTION

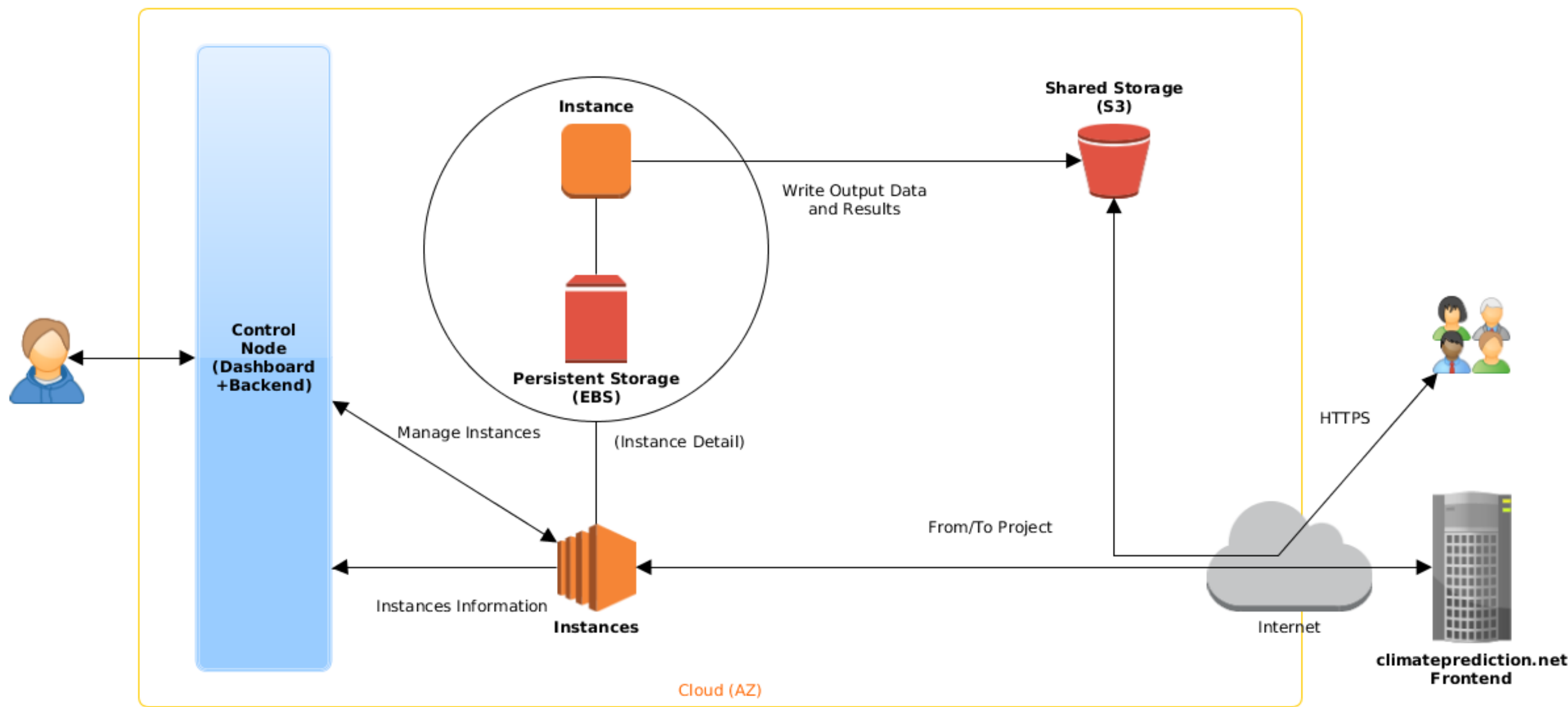


Figure 1. Proposed Solution Cloud

Infrastructure.

- Control Plane that enables high level access and agnostic access.
- Tested into Amazon Web Services (AWS): Computing side (BOINC Client) over EC2 and S3 for storage (BOINC Upload Server).

RESULTS

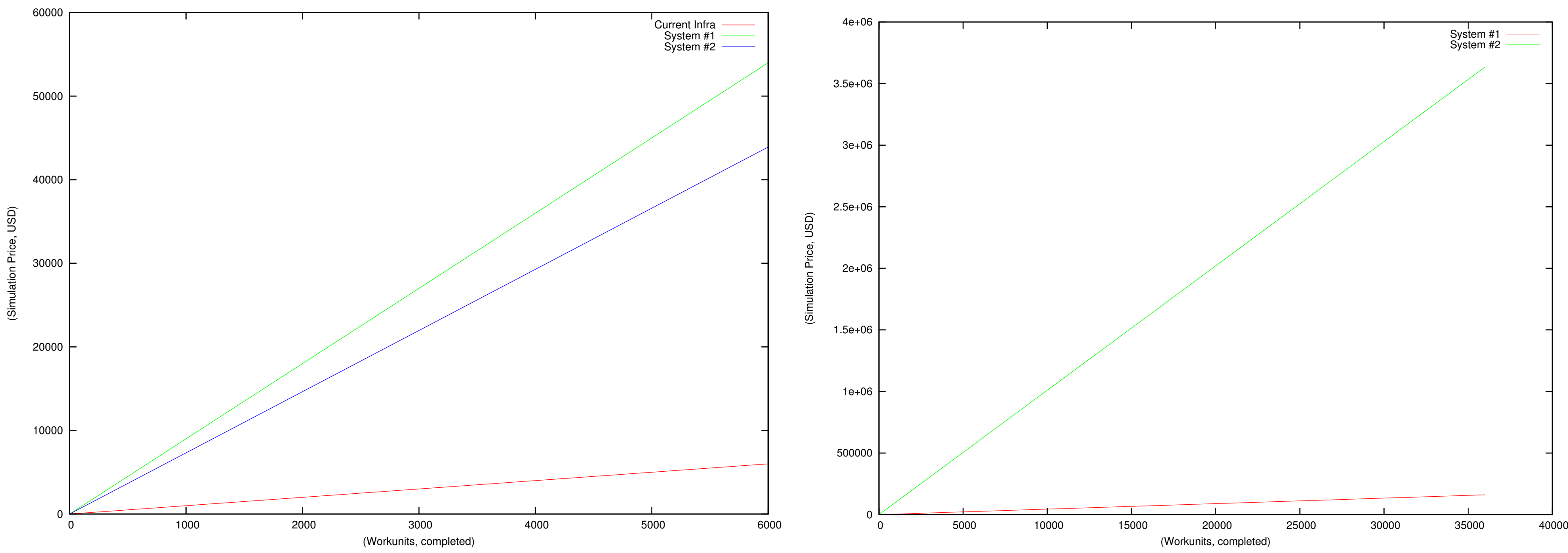


Figure 2. Time per Workunit and Simulation Cost.

- Infrastructure successfully migrated and full simulations were completed.
- Two different systems (AWS instances) tested at the time of the experiment (System #1: m1.large, System #2: cg1.4xlarge. Figure 2)

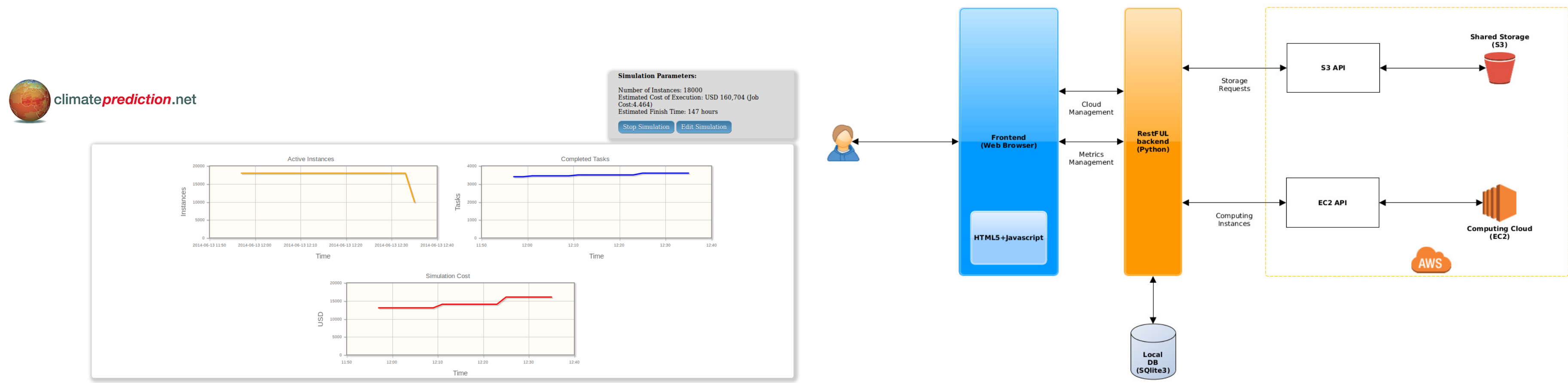


Figure 3. Dashboard and Architecture.

- Control Plane developed, deployed and tested (Figure 3).
- A comprehensive cost of the project and the simulation was achieved, as well as metrics over it.

REFERENCES

[1] Añel, J. A. The importance of reviewing the code *Commun. of the ACM*, 5, 10.1145/1941 487.1941 502., 2011. [2] climateprediction.net Weather@home *the causes of the UK winter floods*, <http://www.climateprediction.net/weatherathome/>, 2014.