



Predicting The Future

...or...

What We've Done In The Past

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Tessella Support Services plc

Overview

- ❑ Tessella
- ❑ Some distributed projects
 - ❑ Climate Prediction
 - ❑ JAC @ JET
 - ❑ Tessella GTI
- ❑ Observations

Tessella's Background

- ❑ Software services company serving a wide customer base
- ❑ Formed in 1980, independent
- ❑ 140+ Technical Staff
 - ❑ Programmers, Consultants & Project Managers
 - ❑ All trained in software engineering
- ❑ ~£10M Turnover (2005/06)
- ❑ ISO 9001 & TickIT since 1992
- ❑ “Investor in People” Status
- ❑ Long-term client partnerships



Registration Number 003
FM22778



INVESTOR IN PEOPLE

climateprediction.net

- Met Office Hadley Model
 - Widely used climatology code
 - UNIX-based
 - Various starting values and “tweaks” possible
 - Years of model time = many hours of supercomputer time



Distributed Approach

- ❑ Many years of model time = many weeks of PC time...
- ❑ ...but many more PCs than supercomputers!
- ❑ Many PC CPU cycles unused (3GHz machines running Word + Outlook)

Collaboration Team

- ❑ Oxford University Atmospheric, Oceanic and Planetary Physics
- ❑ Oxford University ComLab
- ❑ Reading University, RAL
- ❑ Tessella, Met Office
- ❑ NAG, Open University, et al
- ❑ DTI funded



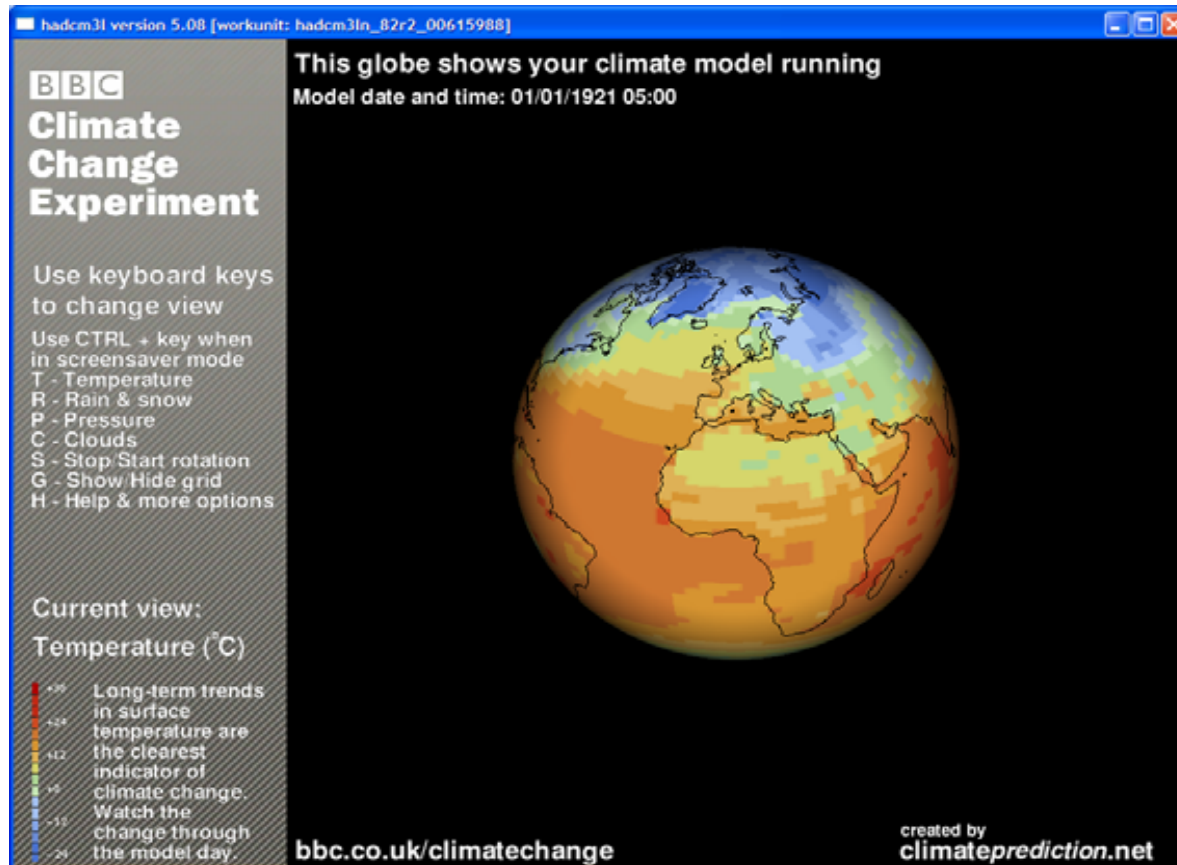
climate*prediction.net* launch



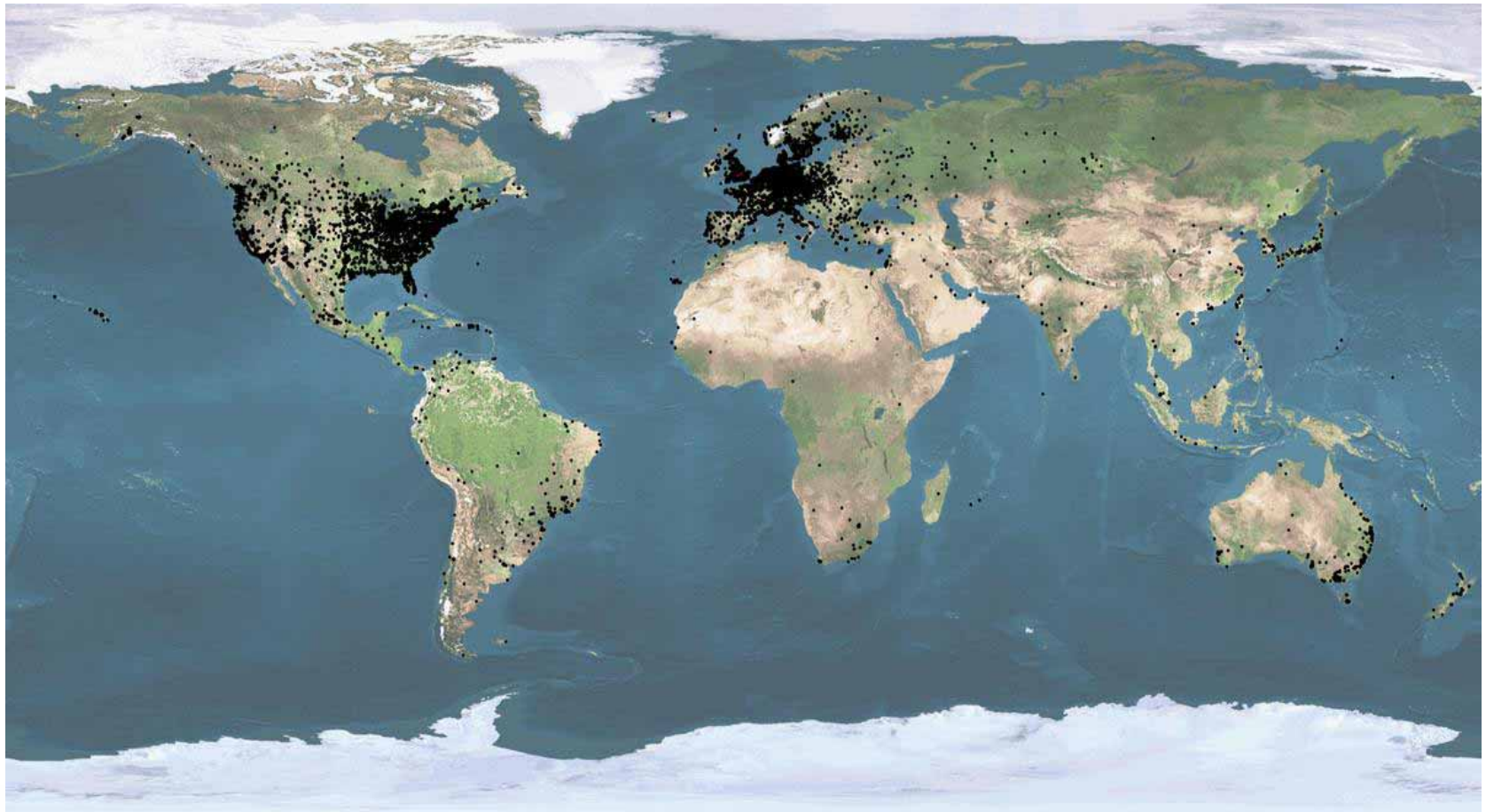
climate*prediction.net* launch



Application to *climateprediction.net*



Current status



ClimatePrediction.Net gateway - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.climateprediction.net/index.php

Google

Join ClimatePrediction.net

Search Site

climateprediction.net

Home

- Home - main
- International
- Taking part in CPDN
- About
- Climate Science
- Participant pages
- Project News
- Results
- Press Info.
- Open Uni. Course
- Schools
- Day Course
- Merchandise
- Advanced
- Visualisation
- Contact & Support

Go to CPDN/BOINC pages



Join the climateprediction.net experiment!



Take part in the BBC Climate Change Experiment

Launched by the documentary Meltdown - BBC Four - 20th Feb
experiment created by climateprediction.net

What is climateprediction.net?
Climateprediction.net is the largest experiment to try and produce a forecast of the climate in the 21st century. To do this, we need people around the world to give us time on their computers - time when they have their computers switched on, but are not using them to their full capacity.
[\[read more about the experiment\]](#)

Why?
Climate change, and our response to it, are issues of global importance, affecting food production, water resources, ecosystems, energy demand, insurance costs and much else. There is a broad scientific consensus that the Earth will probably warm over the coming century; climateprediction.net should, for the first time, tell us what is most likely to happen.
[\[read more about climate science\]](#)

What do we want you to do?
You can download a climate model from this website. It will run automatically as a background process on your computer whenever you switch your computer on. It should not affect any other tasks you use your computer for. As the model runs, you can watch the weather patterns on your, unique, version of the world evolve. The results are sent back to us via the internet, and you will be able to see a summary of your results on this web site. Climateprediction.net uses the same underlying software, BOINC, as many other distributed computing projects. If you like, you can participate in more than one project at a time.
[\[go to BOINC/ climateprediction.net download page\]](#)

If you are in the climate research community and are interested in participating in the experiment in a research capacity, the **research pages** provide some basic background material.

News

- New climateprediction.net team member
[Mon, 09 Oct 2006]
- student wins prize for cpdn paper
[Fri, 29 Sep 2006]
- CPDN Virtual Open Day
[Thu, 17 Aug 2006]

Experiment Status

17-Oct-2006 22:48:02

Total Model Years
18,026,974.328
Classic - 3,422,106.908
BOINC - 10,766,919.360
BBC - 3,837,948.060

Tricking Machines
59,940
Classic - 1,216
BOINC - 28,111
BBC - 30,613

Completed HadSM3 Runs
168,977
Classic - 50,593
BOINC - 118,384

Completed Sulphur Cycle Runs
13,165

Completed HadCM3L Spinups
61

Completed HadCM3L Transient Runs
1,964
BOINC - 704
BBC - 1,260

Last updated
Classic
18-Oct-2006 21:14:34
BOINC
19-Oct-2006 10:06:08
BBC
17-Oct-2006 22:48:02

Done

Internet

Other Distributed Computing

- ❑ [seti@home](#)
- ❑ [folding@home](#)
- ❑ Many other internet based
- ❑ Beowulf clusters – different set of issues, but in many ways easier to control

Types of Implementation



Server room cluster (dedicated or non-dedicated)

Management control



Office-distributed cluster (non-dedicated)

Leverage existing resources



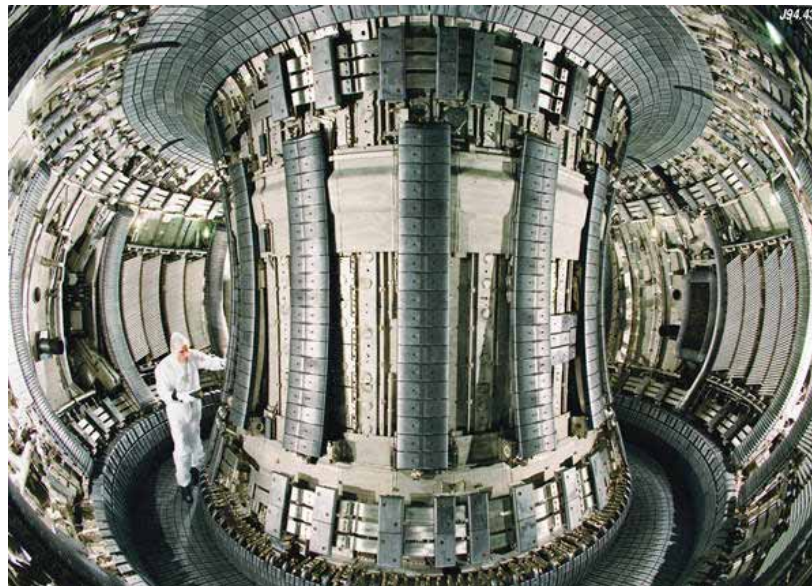
Geographically-distributed cluster (non-dedicated)

World's your oyster

JET



- World's largest fusion research facility



- Modelling & “number crunching”
 - Simulating plasma inside torus in 3d

JET Analysis Cluster

- ❑ 99 Linux nodes (114 processors)
- ❑ Cheap PCs, no screen, no keyboard – few £100
- ❑ Centrally managed
- ❑ 85 Gflops
- ❑ Mainly MPI applications
- ❑ 200 concurrent users - requires load balancing

JAC



Early Days ...

JAC in April 2002

JAC

- Rack mounted in server room
- Fast ethernet/Gigabit connections between nodes
- Dedicated Tessella systems administrator
- Tessella involved in many application codes

Tessella GTI

- “Grid Technology Infrastructure”
- Leverage existing desktop and server room resources
- LAN and WAN based
- Based on Condor
- Added web interface, security, web services, ...



Tessella GTI

- ❑ Runs processes low priority on clients
 - ❑ Windows, Linux, Solaris, ...
- ❑ Suitable for exes, dlls, standalone Excel spreadsheets, ...
- ❑ Programmatic interface via web services
- ❑ Secure logon

Submit With Input Files

Tessella GTI - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media

Address http://persephone/condor/form_submit_job.php?appID=18 Go Links

Google Search Web PageRank AutoFill Options

Logged in as Keith Norman (Log Out | Edit Profile | Help | About GTI | Downloads)

Tessella GTI
Scientific software solutions

Admin My Jobs Pool
Submit Job In progress Download Results

Submit a GTI job

Application	Random Walk 1 Dim
Input File	<input checked="" type="radio"/> Default <input type="radio"/> User specified <input type="text"/> <input type="button" value="Browse..."/>
Number of runs	10

Powered by [Condor](#) 14:22:09 12-04-2004

Done Local intranet

Review Progress

Tessella GTI - Microsoft Internet Explorer

Address: http://persephone/condor/show_this_job_status.php?clusterid=29

Logged in as Keith Norman (Log Out | Easmo0) | [Help](#) | [About GTI](#) | [Download](#)

[Admin](#) | [My Jobs](#) | [Pool](#)

[Submit Job](#) | [In progress](#) | [Download Results](#)

GTI Job Status - Job Number 29

Process	Exec	Submission Date	Requested	Input	Log	Kill	Download
29	Random Walk 1 Dim	2004-10-12 14:28:29	10	Inout	Log	Kill All runs	Download

Process	Hostname	Location	Run Start	Full details	Kill?
0	pauli	Cambridge	12-Oct-04 14:28	Full status	Kill This Run
1	phosphor		12-Oct-04 14:28	Full status	Kill This Run
2	puck	Warrington	12-Oct-04 14:28	Full status	Kill This Run
3	paport2	Abingdon	12-Oct-04 14:28	Full status	Kill This Run
4	pneumonia	Abingdon	12-Oct-04 14:28	Full status	Kill This Run
5	pirto	Boston (US)	12-Oct-04 14:29	Full status	Kill This Run
6				Full status	Kill This Run
7				Full status	Kill This Run
8				Full status	Kill This Run
9				Full status	Kill This Run

Powered by [Caddis](#) 14:29:10 12-Oct-2004

Done Local intranet

Check Pool Status

Logged in as Keith Norman (Log Out | Password) | Help | About GTI | Downloads

Admin My Jobs Pool

Summary Status Runs in progress Jobs in progress

List of all machines in currently running in the GTI pool

Hostname	Location	Op Sys	Architecture	Status	Memory	Details
pike	Cambridge	WINNT40	INTEL	Unclaimed	128	Full details
pauli	Cambridge	WINNT50	INTEL	Claimed	384	Full details
puck	Warrington	WINNT50	INTEL	Claimed	511	Full details
paport2	Abingdon	WINNT50	INTEL	Claimed	511	Full details
vm1@phosphor	Abingdon	WINNT51	INTEL	Claimed	255	Full details
vm2@phosphor	Abingdon	WINNT51	INTEL	Claimed	255	Full details
pinto	Boston (US)	WINNT51	INTEL	Claimed	511	Full details
vm2@plaster	Abingdon	WINNT51	INTEL	Unclaimed	511	Full details
pneumonia	Abingdon	WINNT51	INTEL	Claimed	511	Full details

List of all machines missing from the GTI pool

Hostname	Location	Date last seen
pergola	Abingdon	2004-09-16 00:59:59
pestwari	Cambridge	2004-09-13 17:08:17
progress	Abingdon	2004-10-12 13:34:31
poppadom	Cambridge	2004-09-10 16:38:34
popular	Abingdon	2004-10-12 12:31:21
vm1@plaster	Abingdon	2004-10-12 13:34:31
pong	Abingdon	2004-10-12 13:24:34
preview	Warrington	2004-10-11 16:58:45

Local intranet

Download Results

The screenshot shows a Microsoft Internet Explorer browser window displaying the Tesselata GTI web application. The browser's address bar shows the URL `http://persephone/condor/show_my_download_list.php`. The page title is "Tesselata GTI" and the user is logged in as Keith Norman. The navigation menu includes "Admin", "My Jobs", and "Pool". The main content area displays a table titled "GTI Job List (Complete and Incomplete)".

Batch	Exec	Submission Date	Requested	Remaining	Running	Input	Log	Action	Download
72	Random Walk 1 Dim	2004-10-08 15:50:04	10	0	0	Input	Log	Delete all files	Download data
68	Random Walk 1 Dim	2004-10-08 13:31:16	10	0	0	Input	Log	Delete all files	Download data
67	Random Walk 1 Dim	2004-10-08 13:27:30	10	0	0	Input	Log	Delete all files	Download data
29	Random Walk 1 Dim	2004-10-12 14:28:29	10	0	0	Input	Log	Delete all files	Download data
28	Random Walk 1 Dim	2004-10-12 14:26:57	1	0	0	Input	Log	Delete all files	Download data
27	Random Walk 1 Dim	2004-10-12 14:22:39	10	0	0	Input	Log	Delete all files	Download data
15	Random Walk 1 Dim	2004-10-11 13:33:57	20	0	0	Input	Log	Delete all files	Download data
7	Random Walk 1 Dim	2004-09-29 15:14:18	1	0	0	Input	Log	Delete all files	Download data
6	Random Walk 1 Dim	2004-09-29 15:03:56	1	0	0	Input	Log	Delete all files	Download data

Powered by [Condor](#) 14:30:10 12-Oct-2004

Applications

- Flood prediction
- Protein matches
- Particle physics
- Graphics rendering
- Biotechnology searches
- Business analytics
- Clash & crash analysis



charles SCHWAB



Types of Solution

- Globally distributed
 - climateprediction.net, etc
- LAN Distributed
 - GTI, etc
- Controlled Cluster
 - Beowulf
- Lots of success with all