

# Interoperability between Sun Grid Engine and the Windows Compute Cluster

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# Computer Cluster Roadmap

Mainstream HPC

Mainstream High Performance Computing on Windows platform

Version 2  
2008

## Service Pack 1

- ✓ Performance & Reliability Improvements
- ✓ Support for Windows Server 2003 SP2
- ✓ Support for Windows Deployment Services
- ✓ Vista Support for CCP Client tools

## Web Releases

- ✓ MOM Pack
- ✓ PowerShell for CLI
- ✓ Tools for Accelerating Excel

SP1 & Web  
2007

Mainstream High Performance Computing on Windows platform

- ✓ Simple to set up and manage in familiar environment
- ✓ Integrated with existing Windows infrastructure

V1  
Summer 2006

# Mission and Vision for CCS V2

## Continue delivering on v1 objectives

- Tremendous improvements in pre-installation
- Focus on overall performance
- Integrate Customer / Partner Feedback

## Support large clusters

- Create new designs for clusters of size, including “heterogeneous” clusters
- Scale deployment and administration technologies
- Provide interfaces for those accustomed to \*nix

## Improve interoperability with existing IT infrastructure

- Interoperability with existing job schedulers
- High speed file I/O through native support for parallel and clustered file systems

## Broader application support

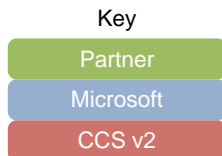
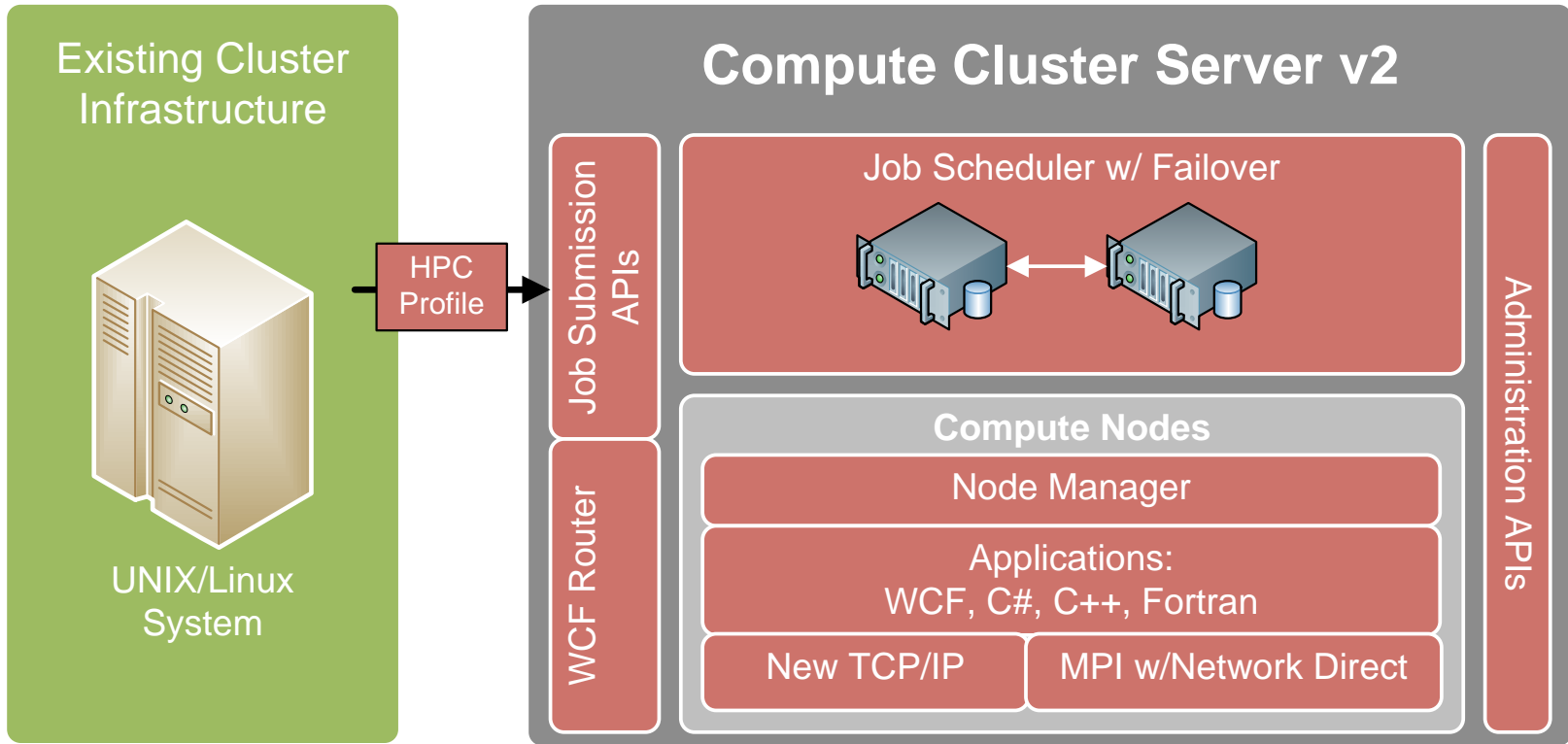
- Simplify the integration of new applications with the job scheduler
- Addressing needs of in-house and open source developers

## Platform Support

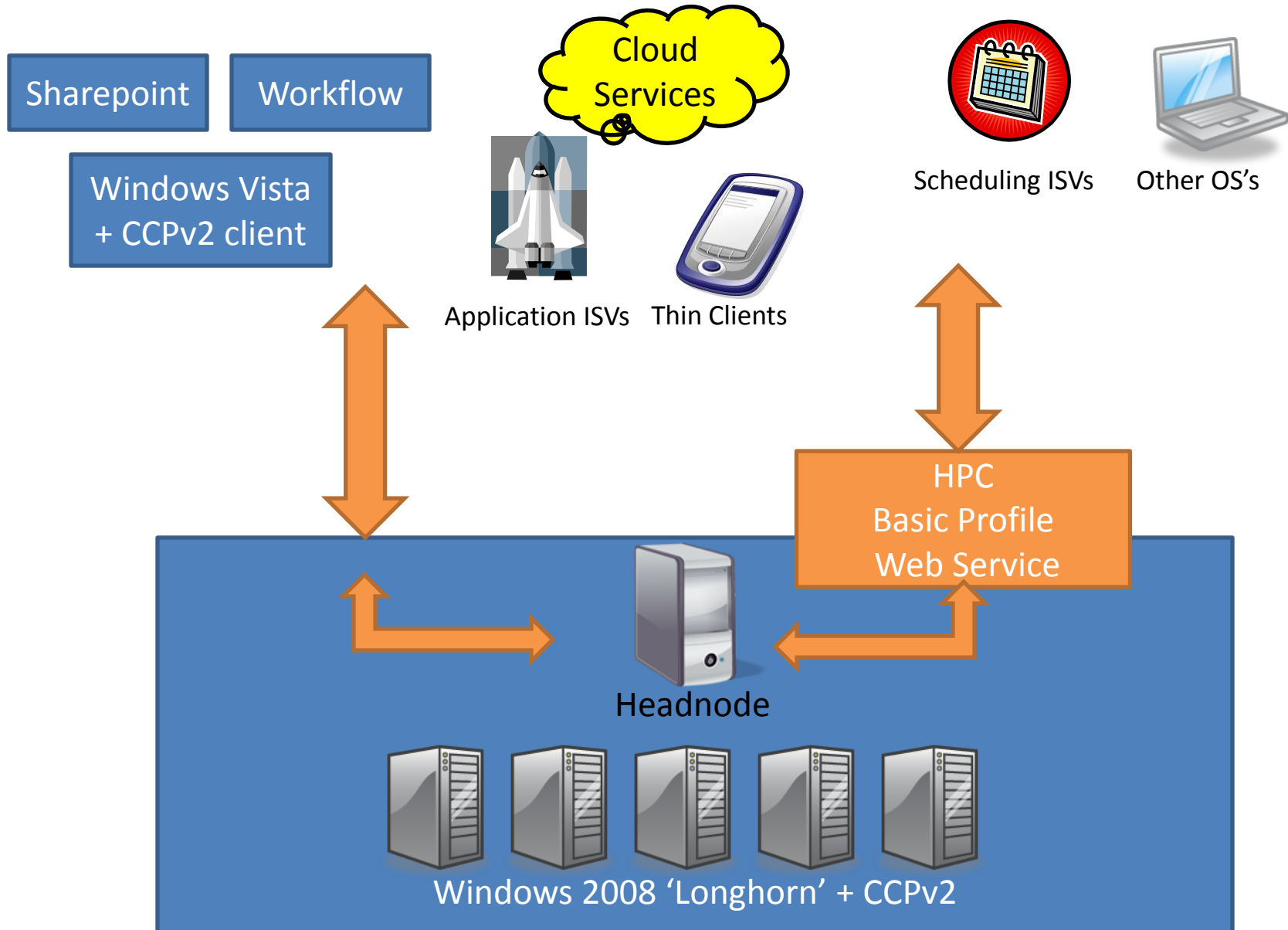
- Longhorn server only
- Cluster nodes with different hardware / software

**Continue to provide a great experience for HPC on Windows  
Provide a route for integration with other platforms through standards**

# High Productivity Computing



# The need for interoperability



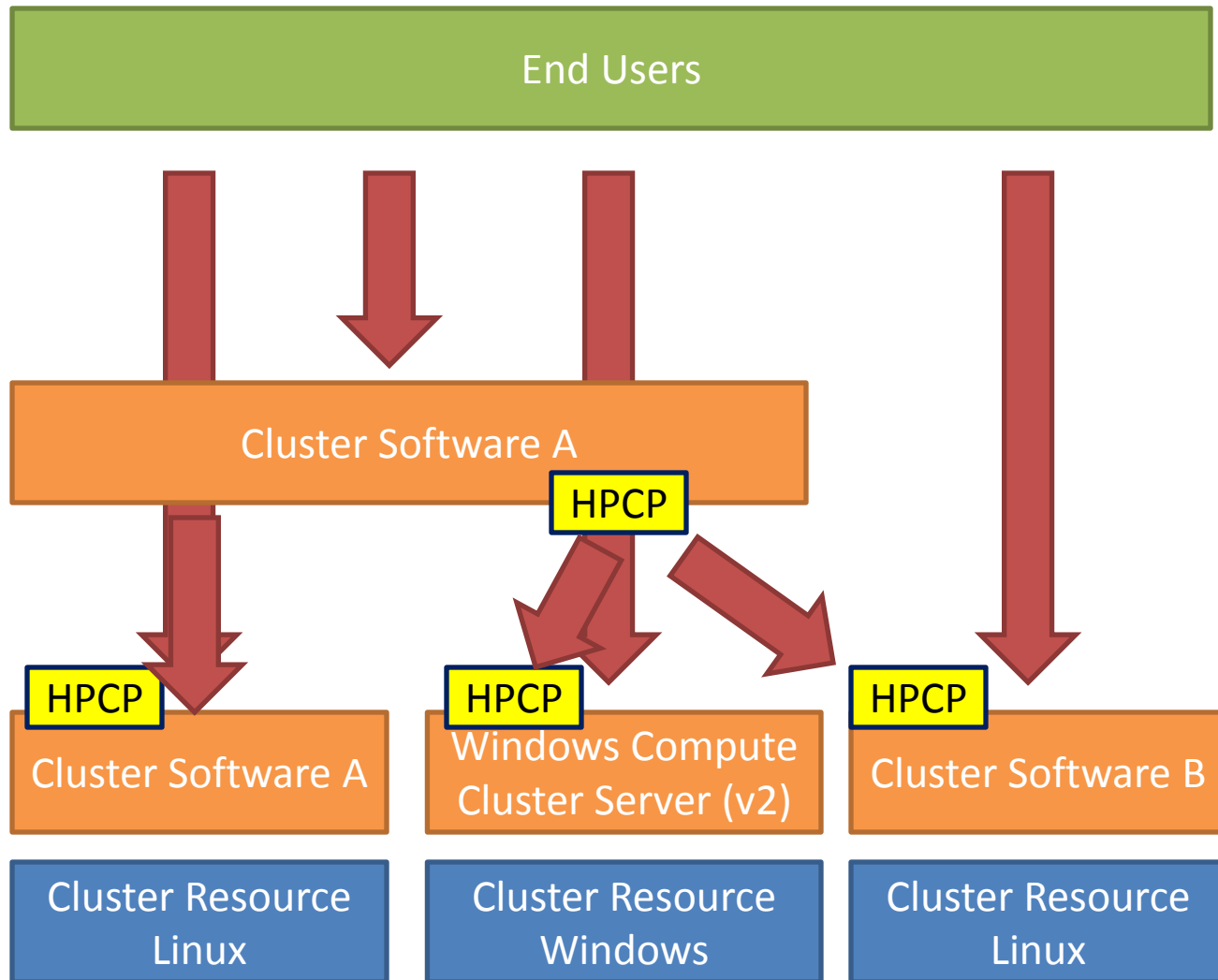
# What is the HPCBP?

- HPCBP: High Performance Computing Basic Profile
  - A web service to interact with HPC resources
  - ‘Basic’ as it deals with the core common use cases
- A standard from the Open Grid Forum (OGF)
- Two supported security schemes (WS-Security)
  - Username & password over TLS
  - X.509 certificate based mutual authentication
- Demonstrated interoperability
  - Draft specification & prototypes at SC06
  - Final specification & product prototypes at SC07

# What does the HPCBP do?

- Create a Job
  - As defined by the HPC Application Profile (XML Schema)
- Manage a Job
  - Determine its status
  - Terminate its activity
  - Discover the job's configuration
- Interaction with the compute resource
  - An information model for jobs and the resource
  - Start & stop the creation of new jobs

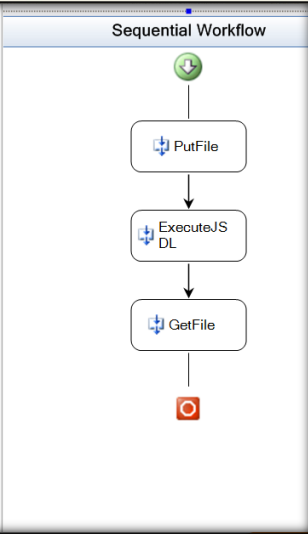
# Support for MetaScheduling





Windows Compute Cluster Server

ID	Name	Status	Submitted By	Priority	Processors	Submit Time	Start Time	End Time
41630	CBSU_30160_IM_pmarko@clernson.edu	Running	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 1:59:23 PM	8/23/2007 1:59:28 PM	N/A
41629	CBSU_30151_..._sp	Finished	MSFTLABS\HPC_...@msftlab.com	Normal	1	8/23/2007 1:57:46 PM	8/23/2007 1:57:53 PM	N/A
41628	CBSU_30154_IM_paulo.ceresini@agrl.ethz.ch	Running	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 10:06:34 AM	8/23/2007 10:06:38 AM	N/A
41627	CBSU_30163_IM_paulo.ceresini@agrl.ethz.ch	Running	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 9:08:52 AM	8/23/2007 9:08:58 AM	N/A
41626	CBSU_30153_IM_pmarko@clernson.edu	Failed	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 7:19:59 AM	8/23/2007 7:20:02 AM	N/A
41625	CBSU_30150_McBayes_mh32@cornell.edu	Running	MSFTLABS\HPC_...@msftlab.com	Normal	16	8/23/2007 7:08:57 AM	8/23/2007 7:09:03 AM	N/A
41624	CBSU_30149_McBayes_mh32@cornell.edu	Running	MSFTLABS\HPC_...@msftlab.com	Normal	16	8/23/2007 7:07:43 AM	8/23/2007 7:07:48 AM	N/A
41623	CBSU_30148_MSDGRATE_...@student.ethz.ch	Running	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 5:24:18 AM	8/23/2007 5:24:24 AM	N/A
41622	CBSU_30147_MSDGRATE_...@student.ethz.ch	Running	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 5:20:20 AM	8/23/2007 5:20:25 AM	N/A
41621	CBSU_30144_MSDGRATE_...@student.ethz.ch	Finished	MSFTLABS\HPC_...@msftlab.com	Normal	4	8/23/2007 5:16:49 AM	8/23/2007 5:16:55 AM	N/A



HPC Basic Profile

CCSv1

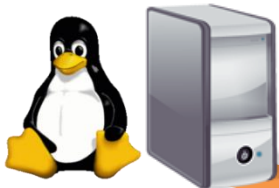


C#

HPC Basic Profile

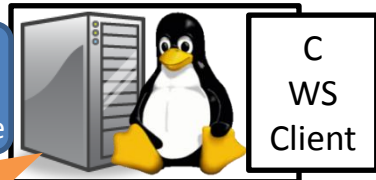


LSF 7.0.1



SGE cmds

HPC Basic Profile



SGE 6.1

# SGE Integration

- Use transfer queue mechanism
  - Starter method script
- Job script
  - Can contain SGE directives
  - Commands for execution on Windows cluster
- Generate JSDL wrapper for the job script
  - Job script stripped of SGE directives
  - Batch script FTP'ed to Windows cluster
- Use HPCBP WS to start JSDL specified job

# SGE Integration

- Poll for remote job completion through HPCBP
- Retrieve standard input & output files
  - As a result of running the remote job
- Add to local job's standard input & output
- Not implemented
  - Suspend & remove: no support in HPCBP
  - Load Average

# Issues

- Need to access Windows cluster
  - Remote domain\user name & password
  - Remote FTP filepath for each user
  - Currently hard wired single user (so secure!)
- Load average
  - HPCBP can retrieve number of remote activities
- Application file staging
  - Declaration of application input & output files
  - Proposed extension to HPCBP

# Summary

- Demonstrated proof of concept
  - Not and (probably) never will be product
- Looking for collaborations to:
  - Support customer deployments
  - Drive use cases for further HPCBP activity
- Will document on [www.windowshpc.net](http://www.windowshpc.net)
- Contact:
  - [steven.newhouse@microsoft.com](mailto:steven.newhouse@microsoft.com)
  - [www.windows.com/hpc](http://www.windows.com/hpc)