



# HTCondor on the Grid and in the Cloud

# Regular HTCondor

- › Distributed batch system
- › High Throughput Computing
- › Manages both jobs and resources
  - And matching them to each other
- › But what about machines managed by other systems...

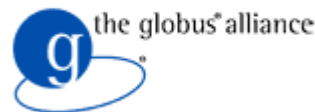
# HTCondor-G(rid)

- › Job management for other scheduling systems
- › Same job interface as regular HTCondor
  - Persistent client-side job queue
  - Job policy expressions
  - Fault-tolerance
  - Work-flow management

# Grid Universe

## › Many schedulers supported

- Globus GRAM
- CREAM
- NorduGrid ARC
- HTCondor
- PBS/SLURM
- LSF
- SGE
- UNICORE
- BOINC



# BOINC

- › Berkeley Open Infrastructure for Network Computing (nee SETI@Home)
- › Middleware system for volunteer computing
- › 250,000 users, 7.3 PetaFLOPS
- › Requires manual setup of application on BOINC server
- › Initial support for submitting jobs to BOINC server

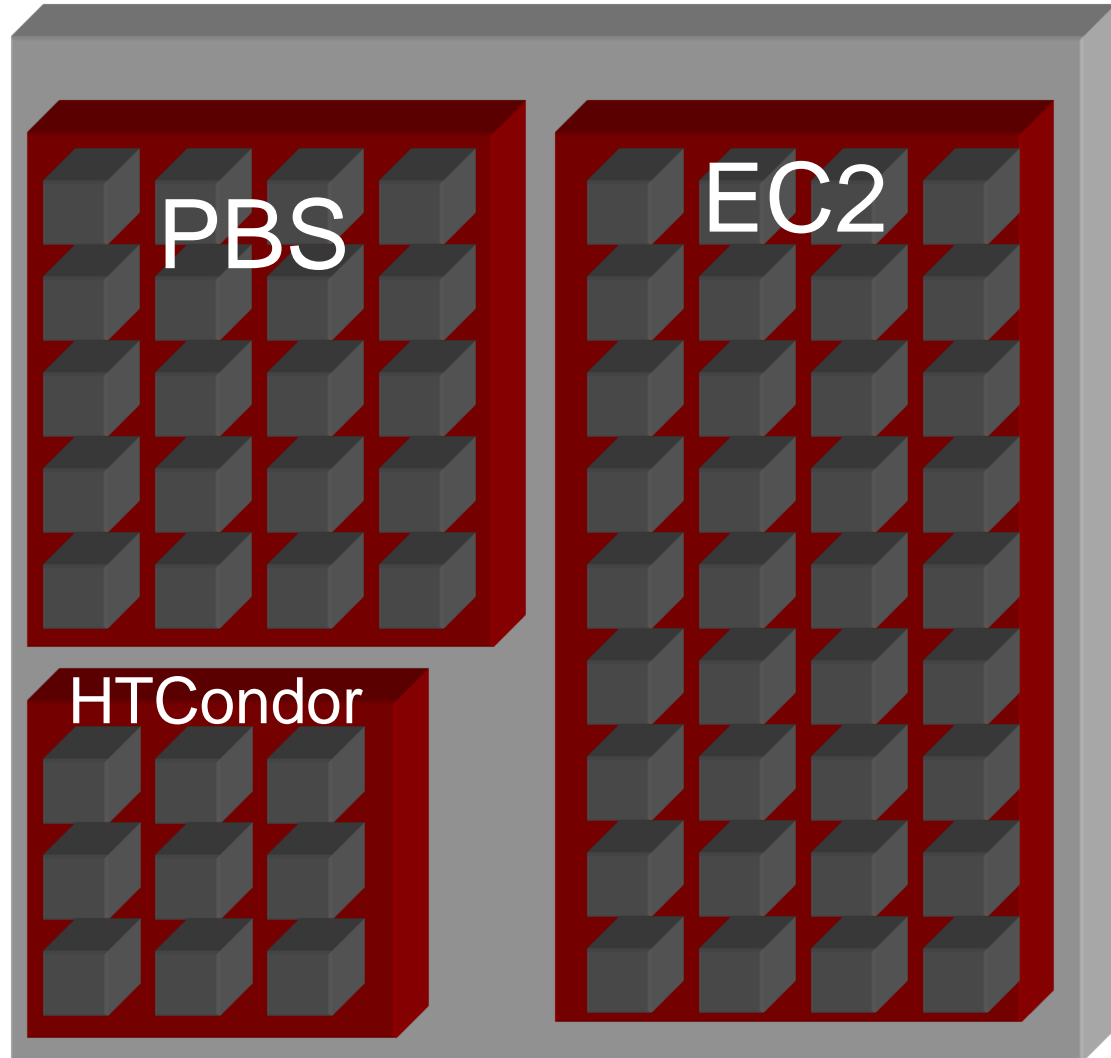
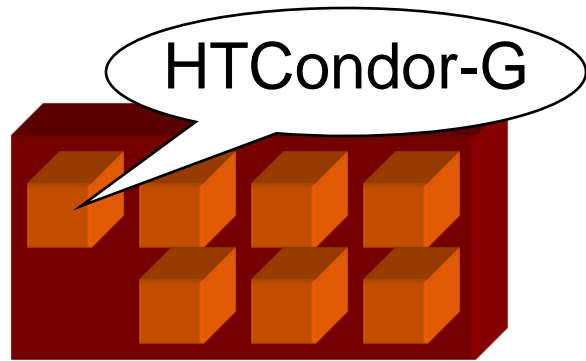
# BOSCO

- › Access remote cluster over SSH
- › Easy for users to setup and use
  - Automated installation
  - No administrator assistance
- › BoscoR
  - Integration with R

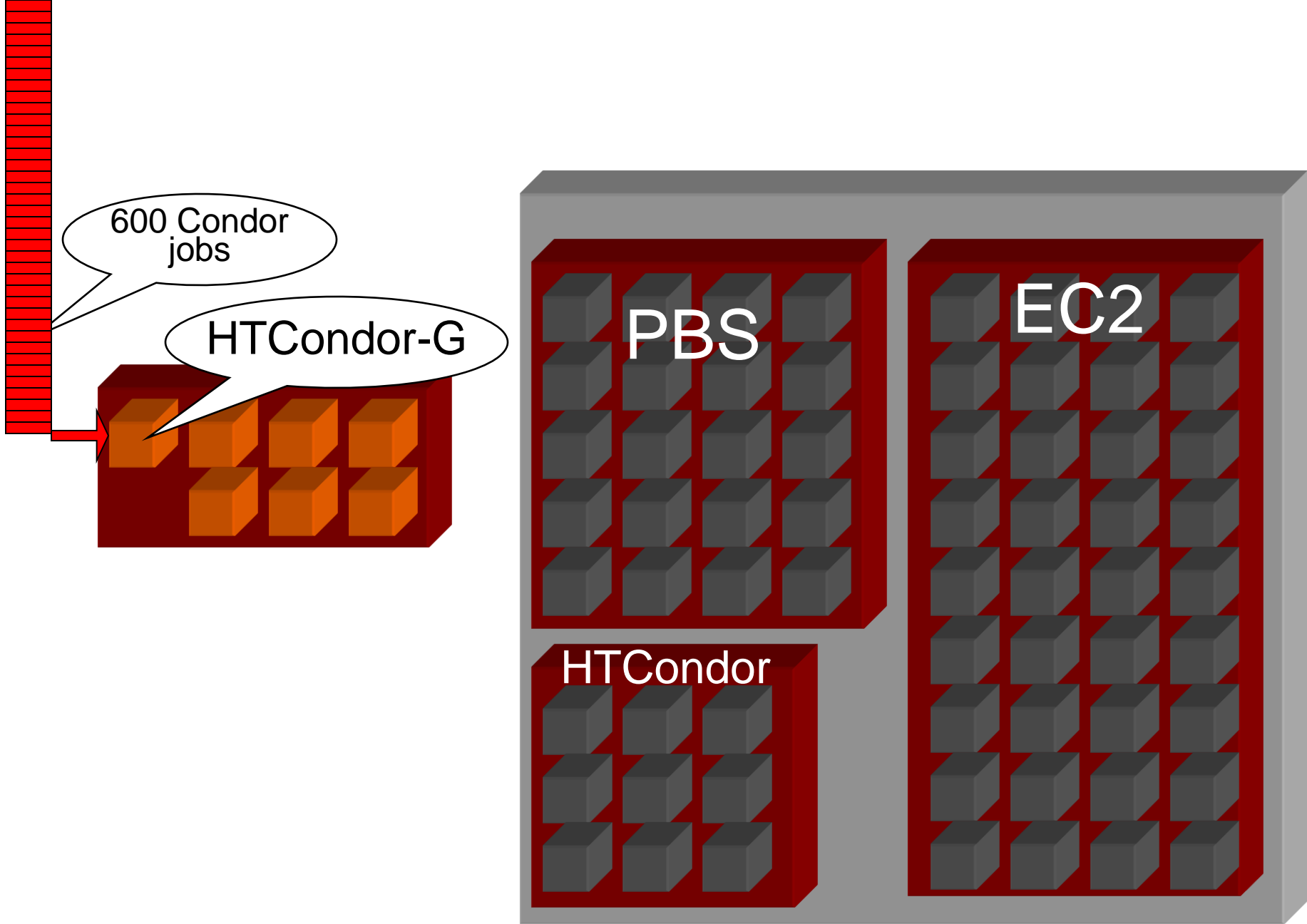


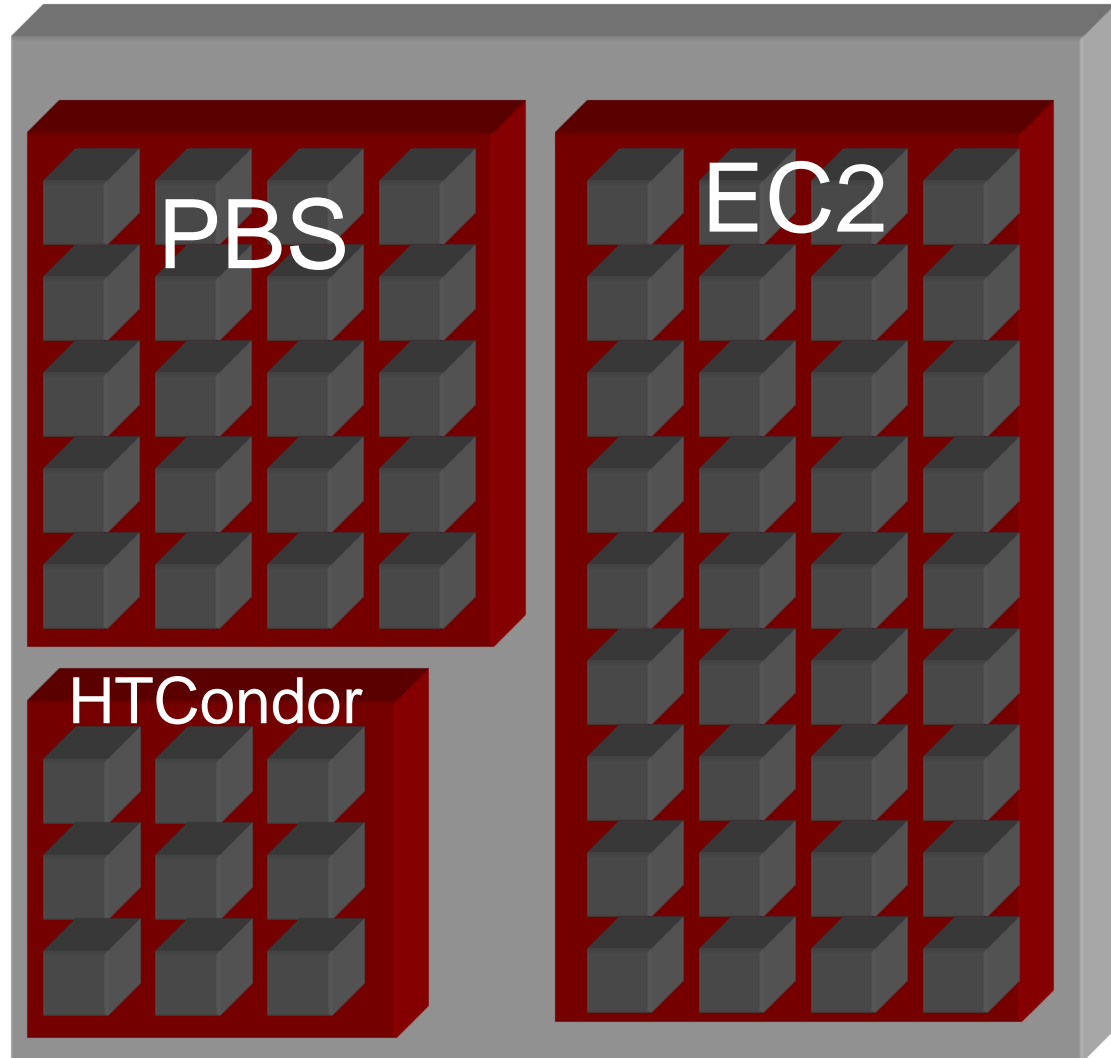
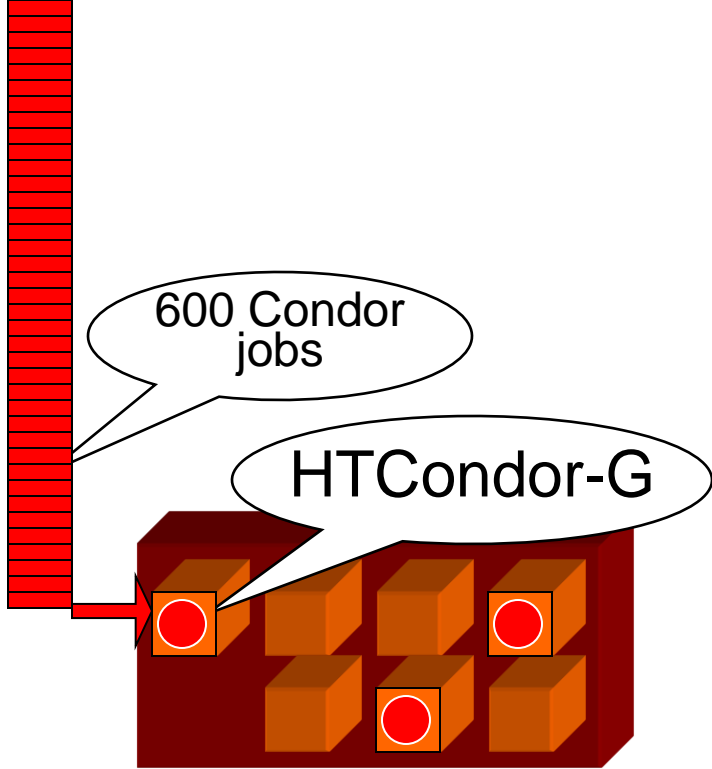
# Glide-In

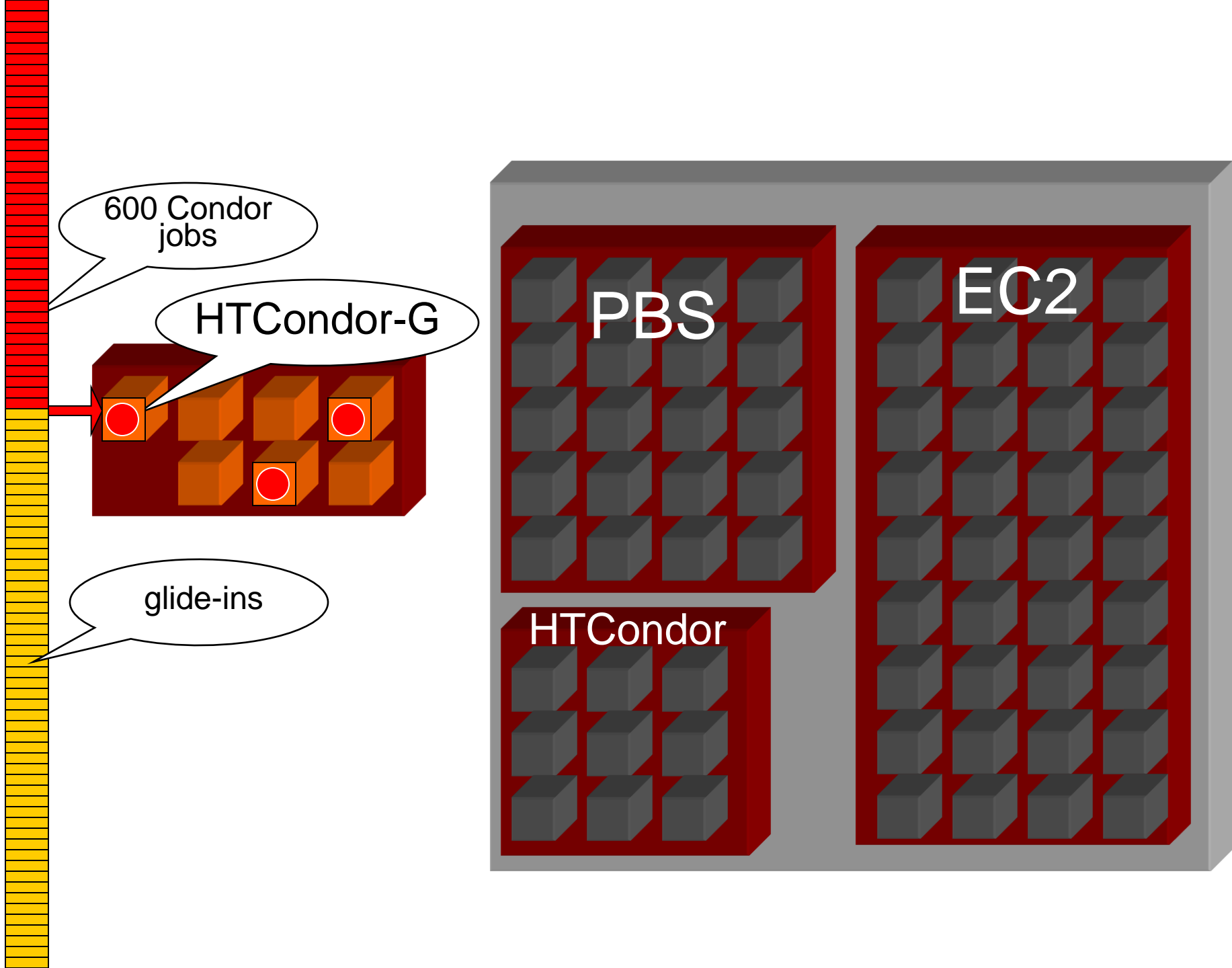
- › Run the HTCondor daemons on Grid resources as user jobs
- › Create a dynamic HTCondor pool from temporarily-acquired Grid resources
- › Late binding of jobs to resources
  - User jobs never wait in a remote queue

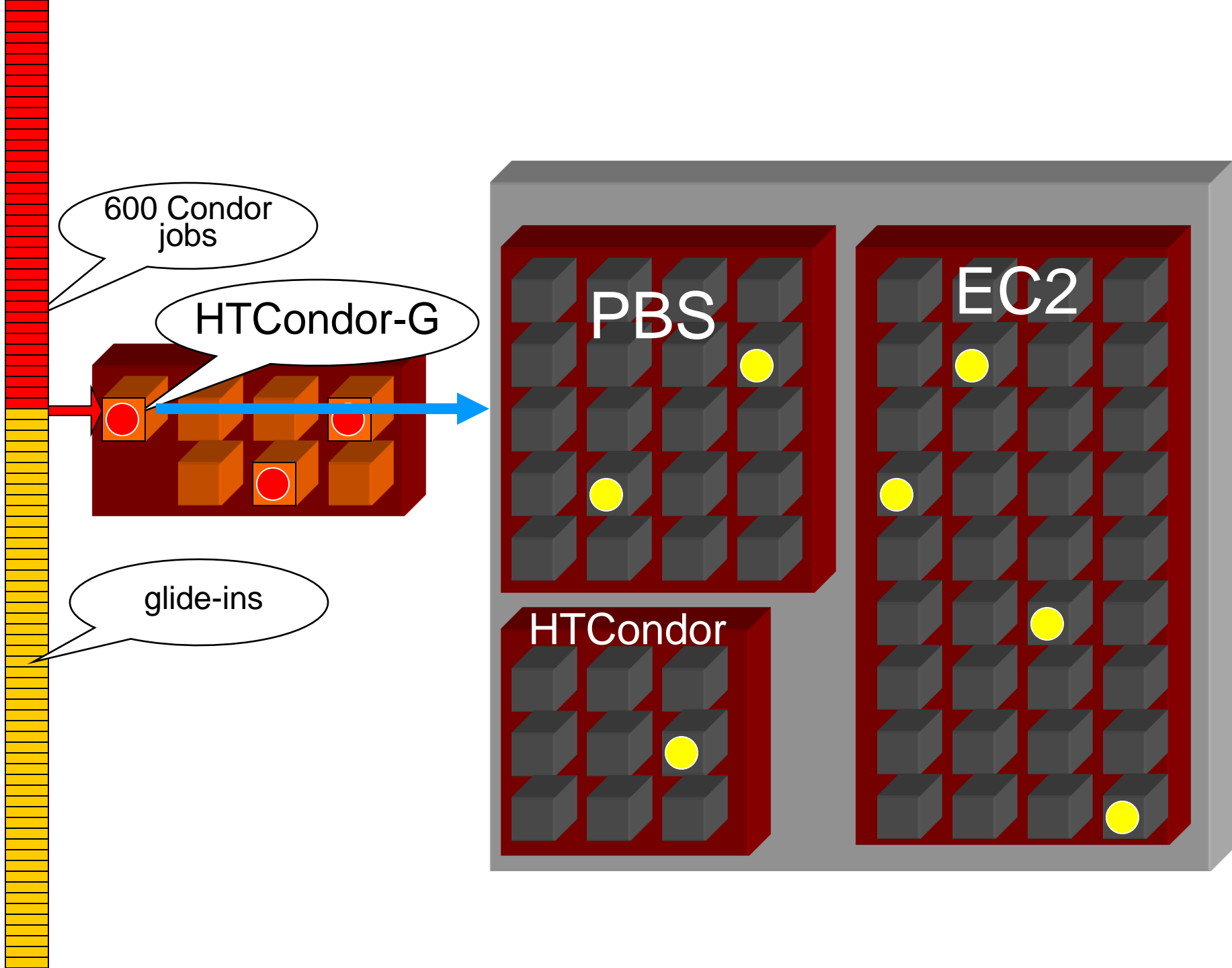


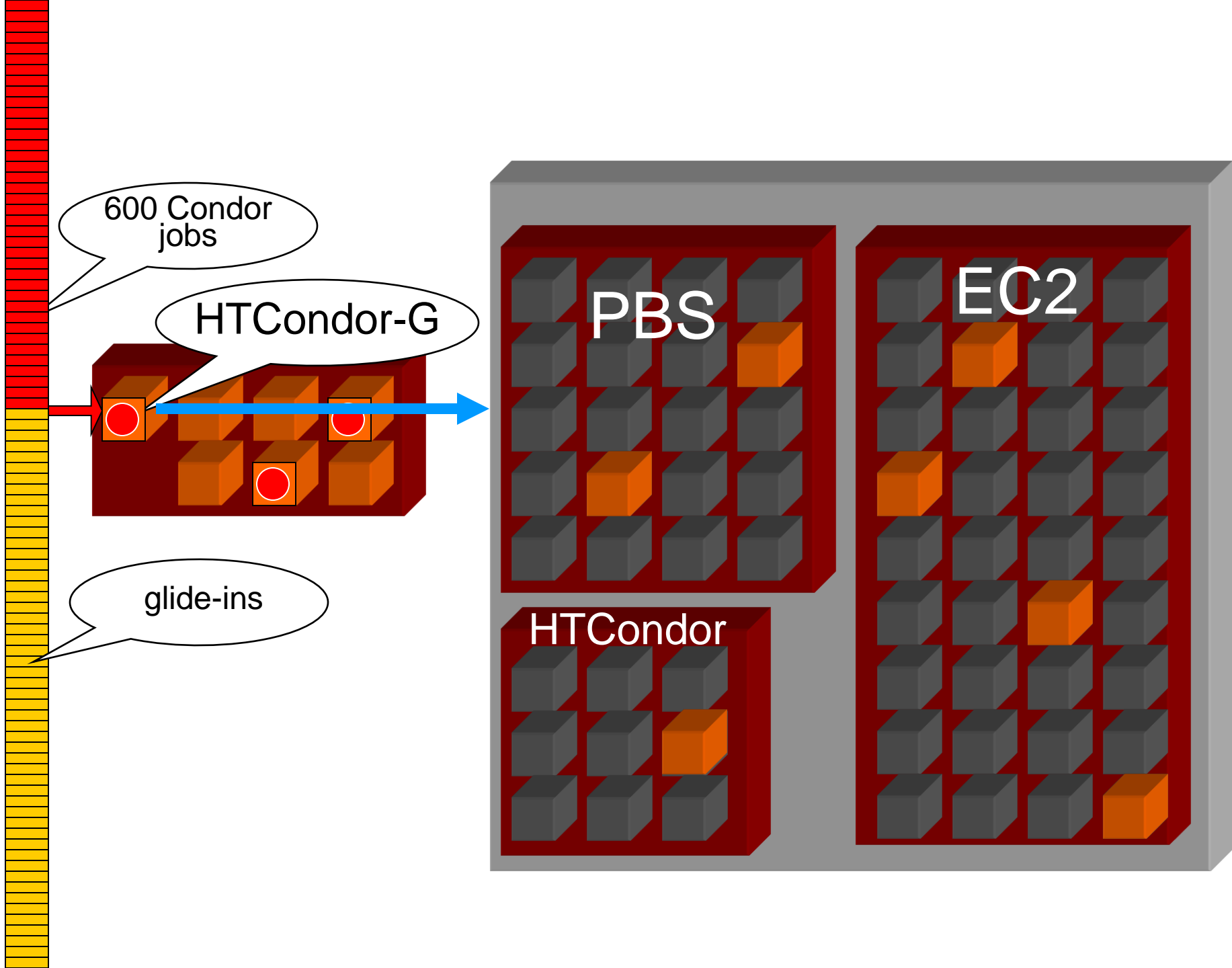


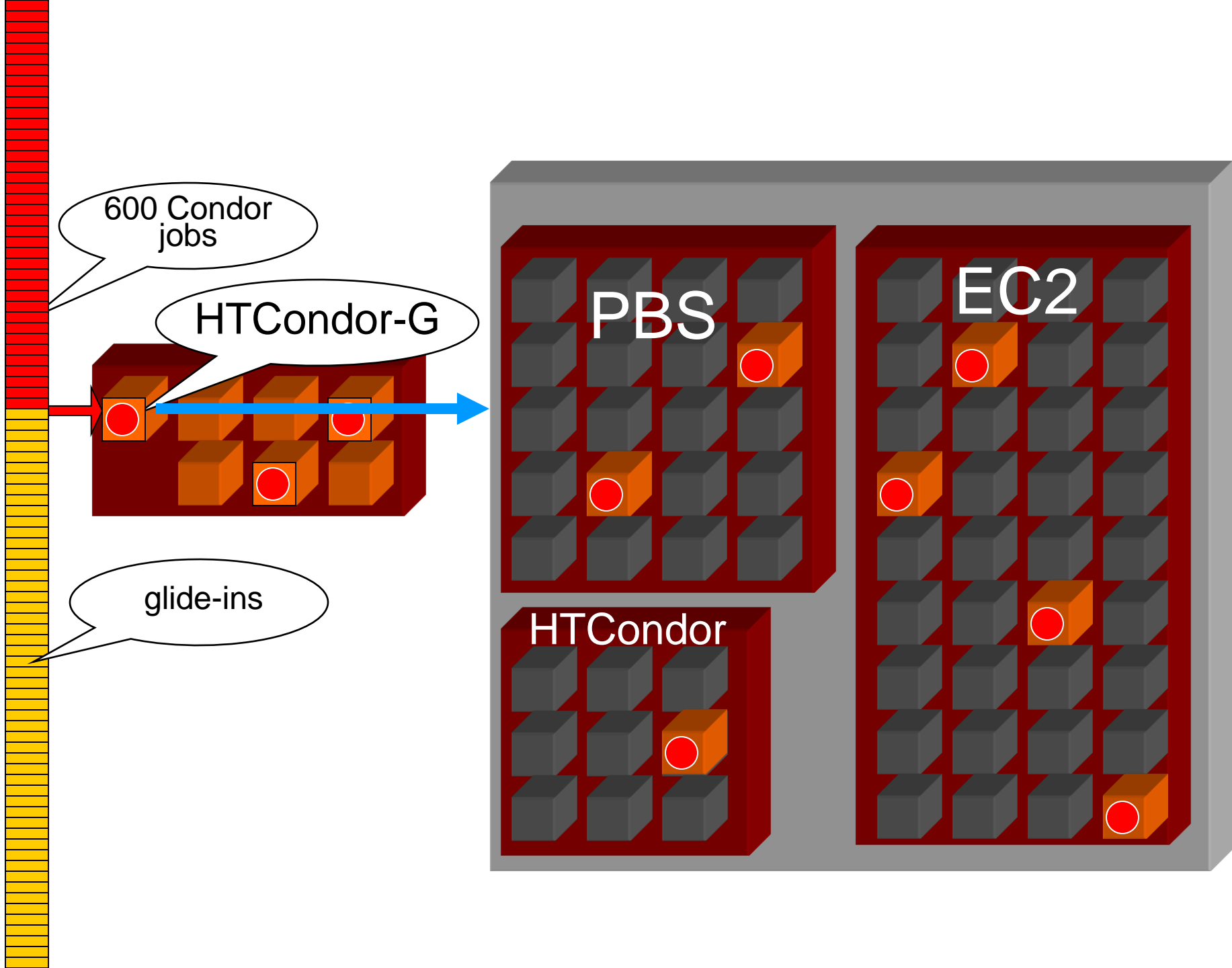












# The Cloud

- › Virtual machine instance as a job
  - Image is the executable
  - Instance data is input
  - Instance shutdown is job completion
- › Works great with Glide-Ins

# Amazon EC2

- › Support basic instance attributes
  - Image, hardware type, instance data, ssh keys, EBS
- › Fault tolerance is tricky
- › Works with other services that speak EC2
- › Spot pricing



# Google Compute Engine

- › Initial prototype
  - Similar to EC2 support
- › Google changed the API
  - We need to update

# OpenStack

- › EC2 compatibility is imperfect
  - Fixing is a low priority
- › We are developing native OpenStack support
  - Use more OpenStack features

# Thank You

› Any questions?