

Condor-G:

HTCondor for grid submission

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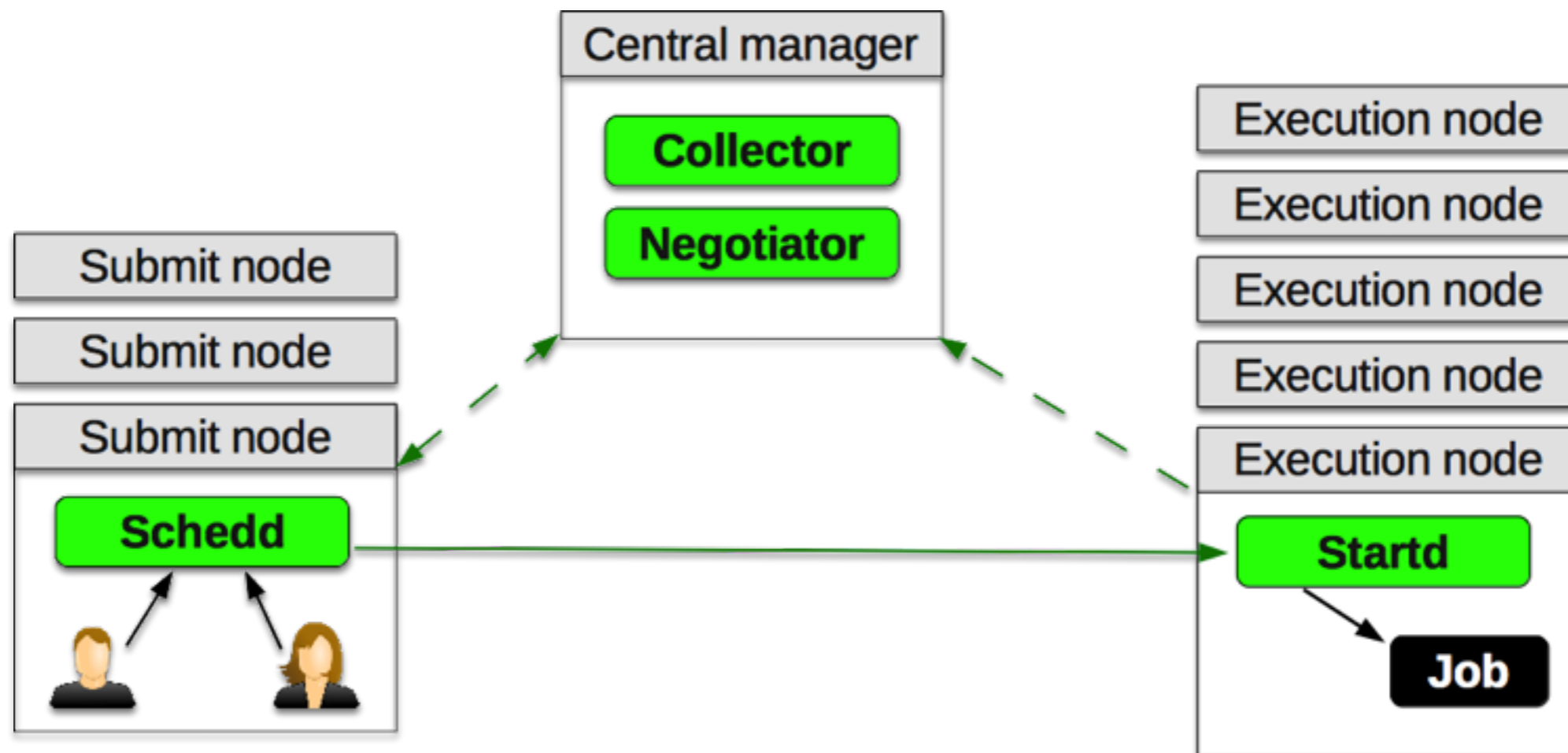
Acknowledgement

- These slides are heavily based on the presentation Jaime Frey gave at UCSD in Feb 2011

<http://www.t2.ucsd.edu/twiki2/bin/view/Main/GlideinFactory1111>

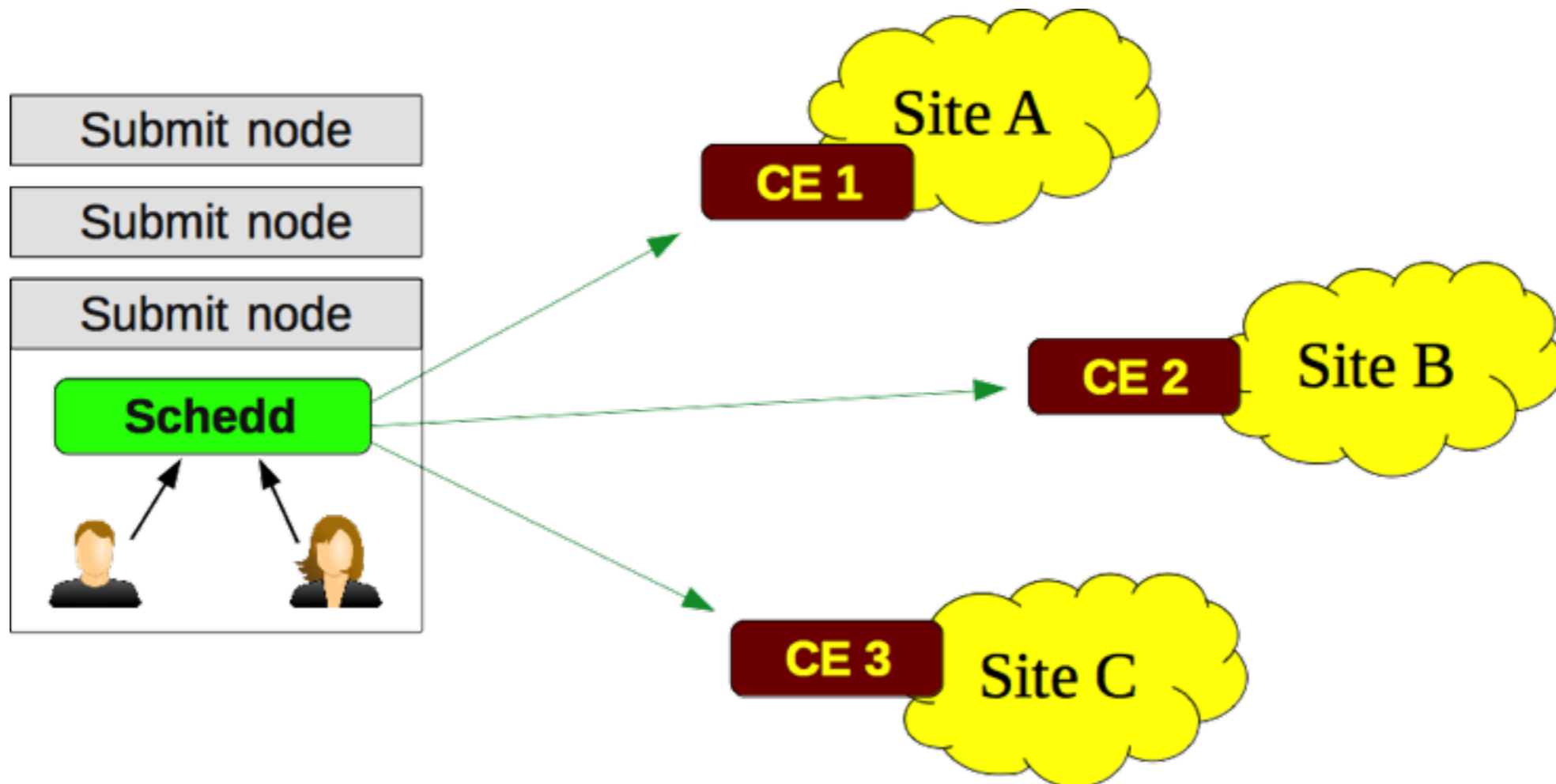
Refresher - HTCondor

- A Condor pool is composed of 3 pieces



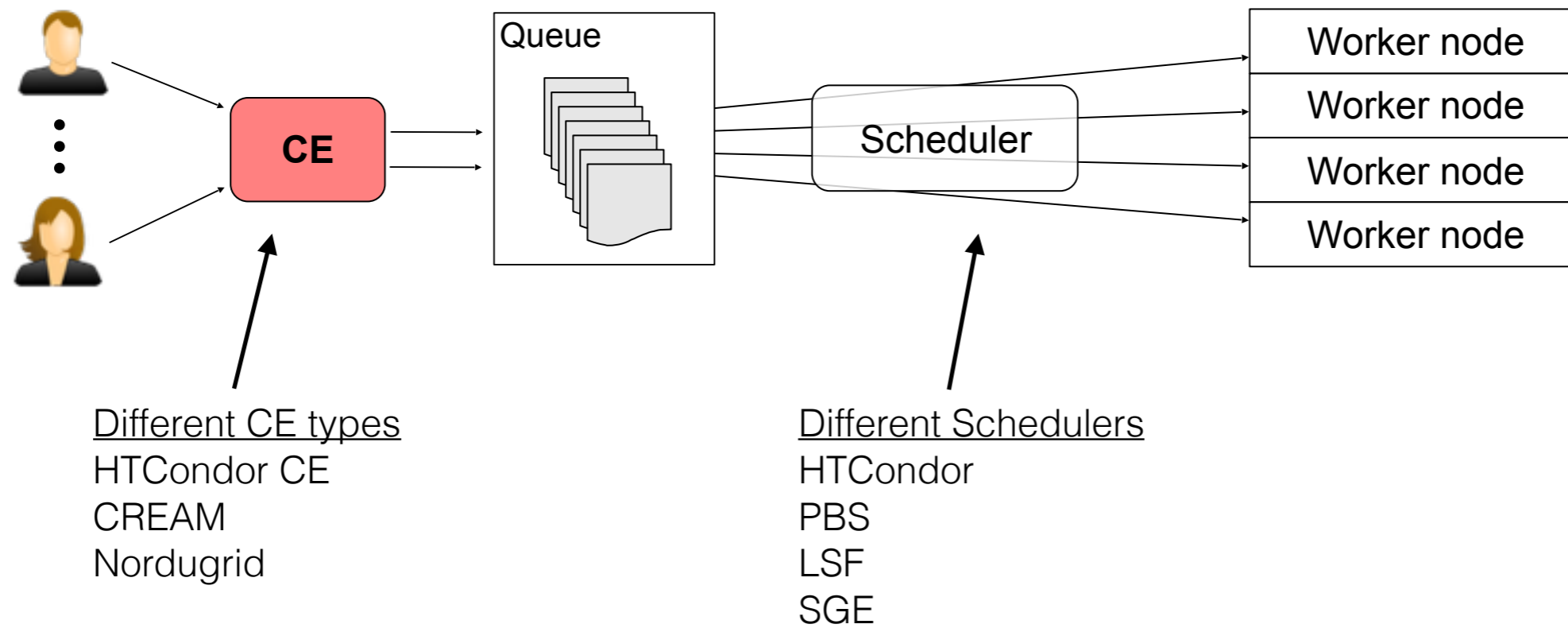
Condor-G

- Condor-G refactors a submit host as a grid client



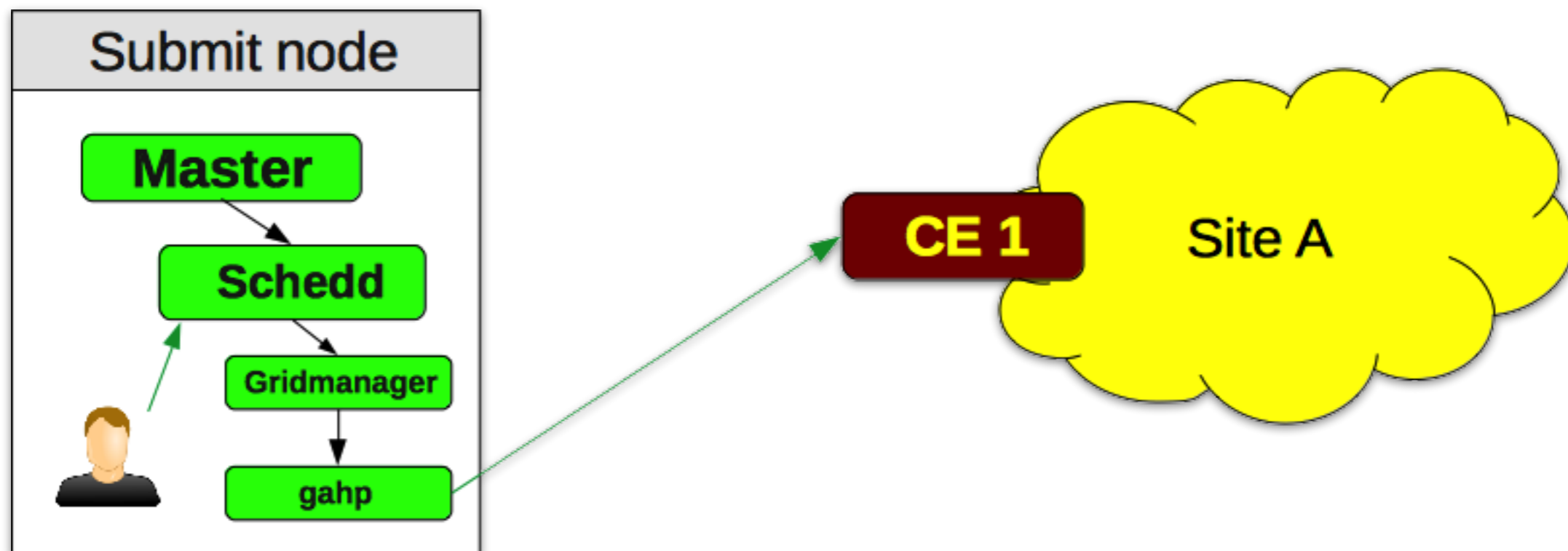
Grid sites

- Recall what a grid site looks like:



Condor-G Daemons

- Condor-G is a normal schedd, but spawns different child processes to manage the grid job
 - recall the vanilla equiv was the shadow process



Gridmanager Daemon

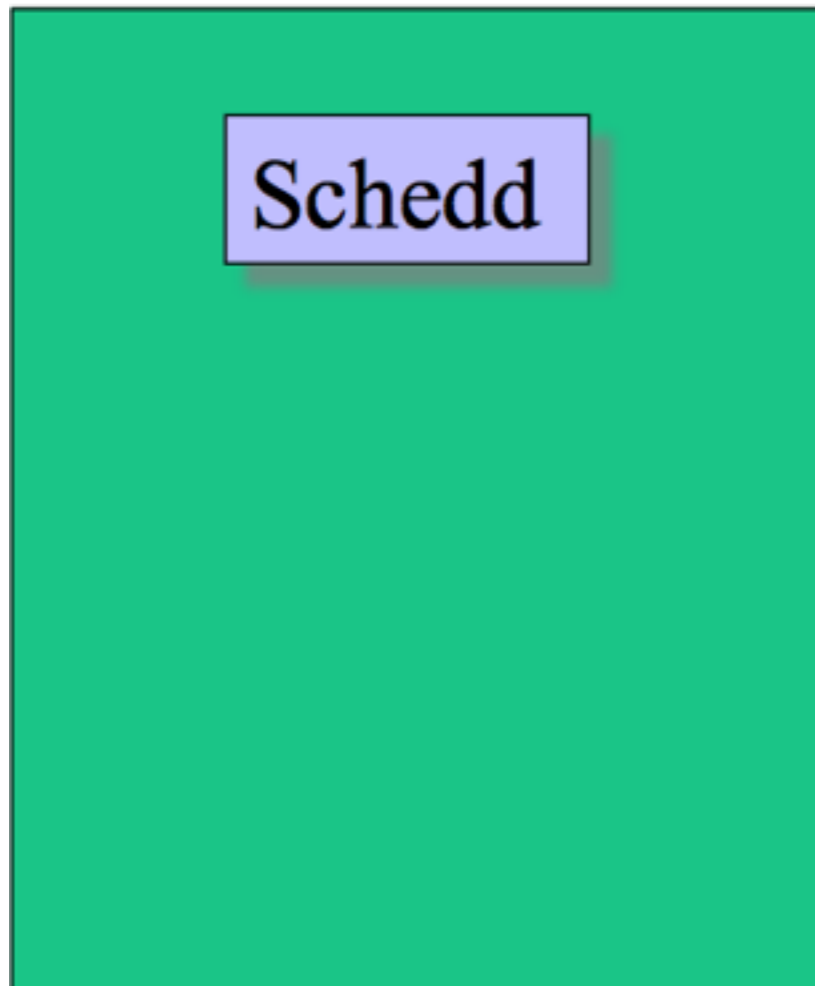
- Runs under the schedd
- Similar to the shadow
- Handles all management of grid jobs
- Single instance manages all grid jobs for a particular user for a given schedd

GAHP (Grid ASCII Helper Protocol)

- Runs under gridmanager
- Encapsulates grid client libraries in separate process
- Simple ASCII protocol
- Easy to use client libraries when they can't be linked directly with the gridmanager
- Each CE type (HTCondor, CREAM) has a different gahp that understands the CE protocol
- Gridmanagers only understand how to communicate with the GAHP
 - think of GAHP as a CE protocol translator for the grid manager

How it works

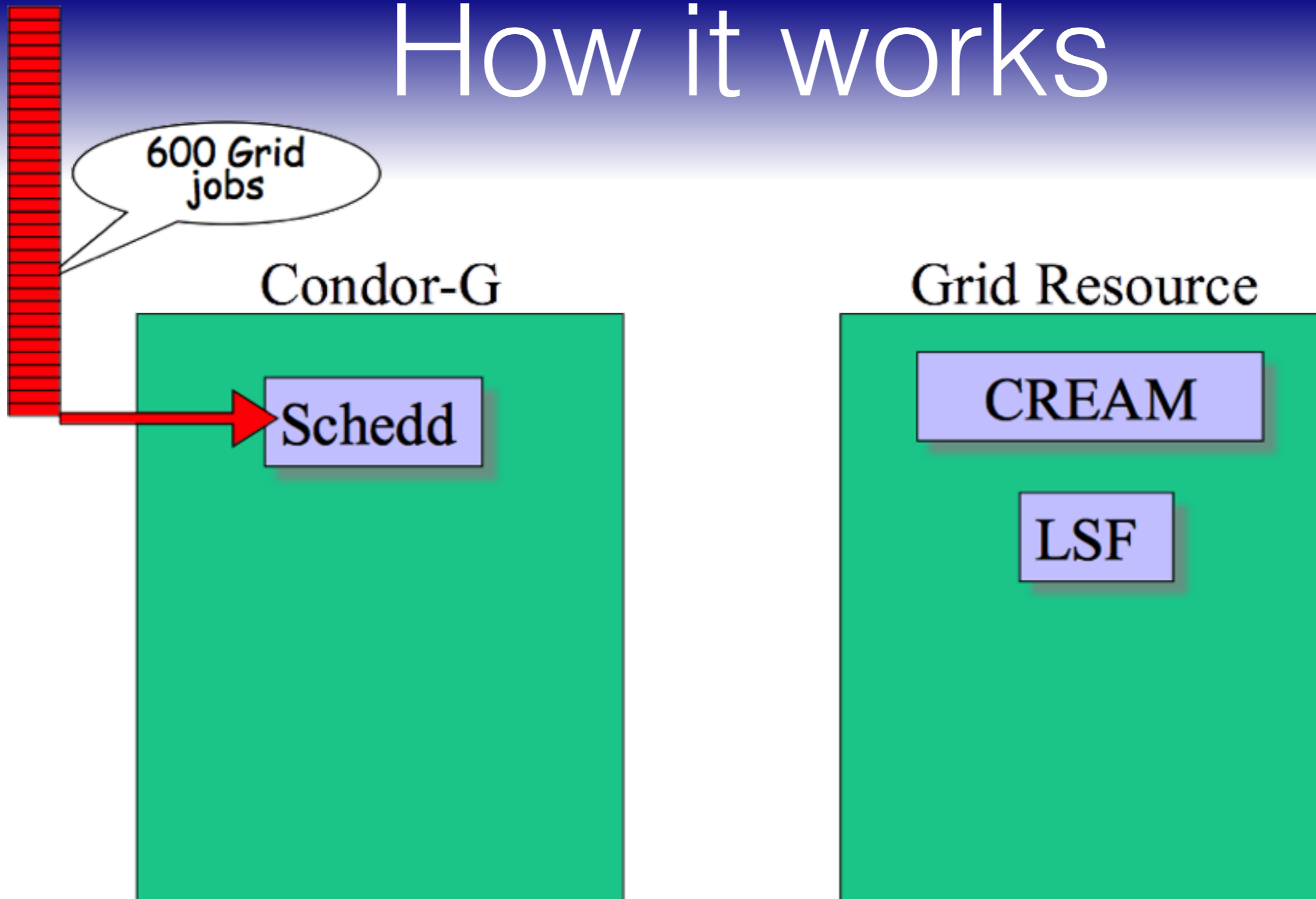
Condor-G



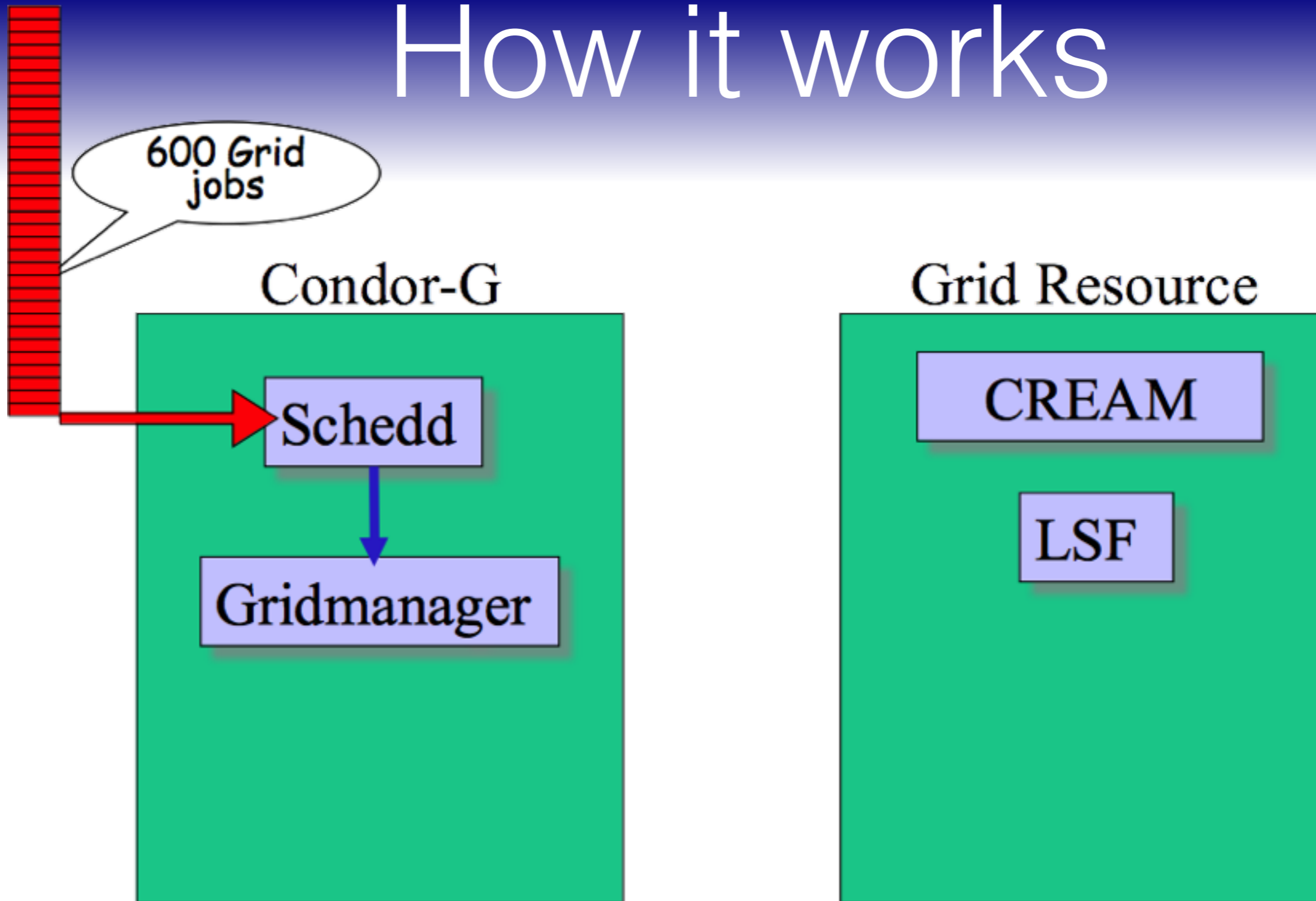
Grid Resource



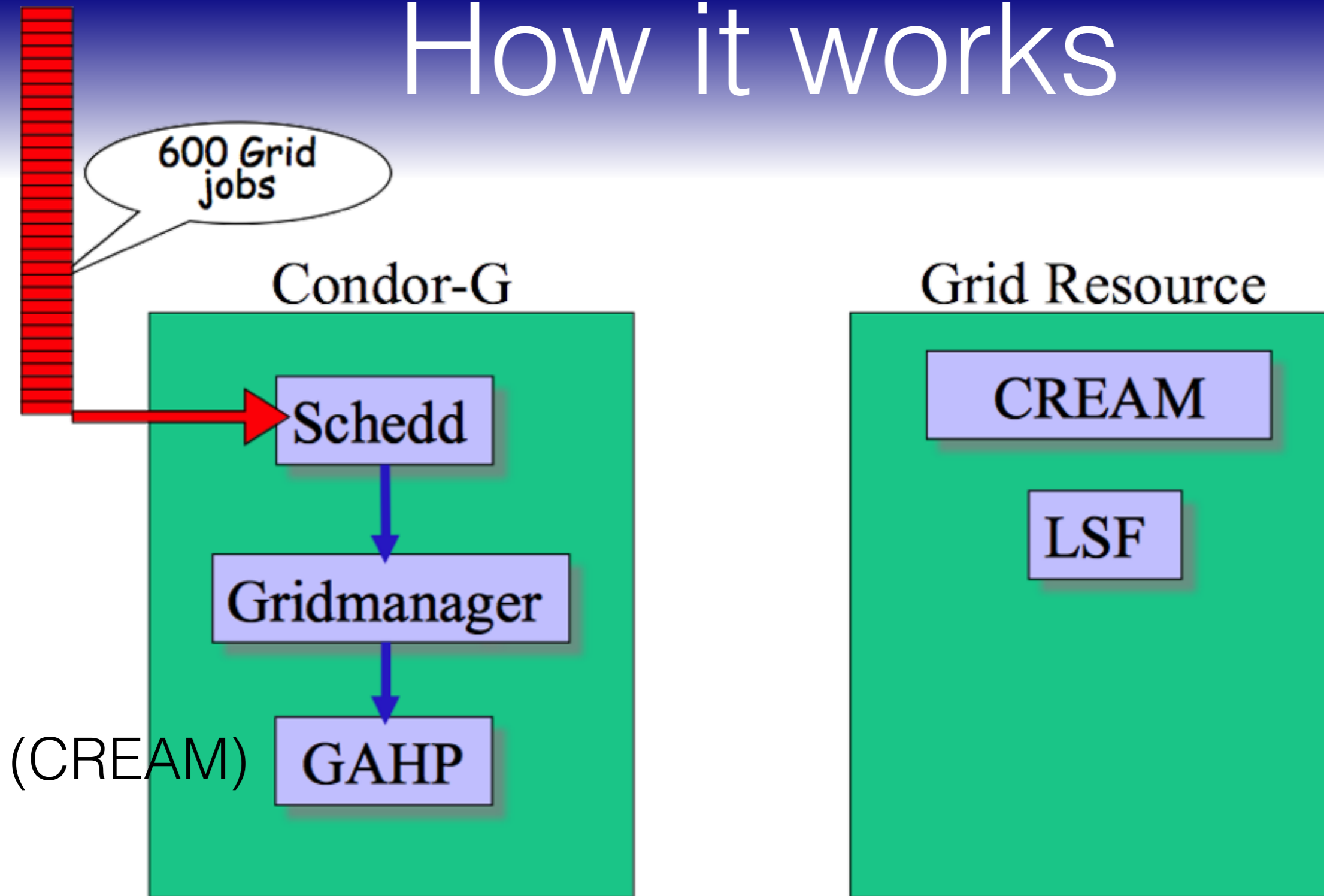
How it works



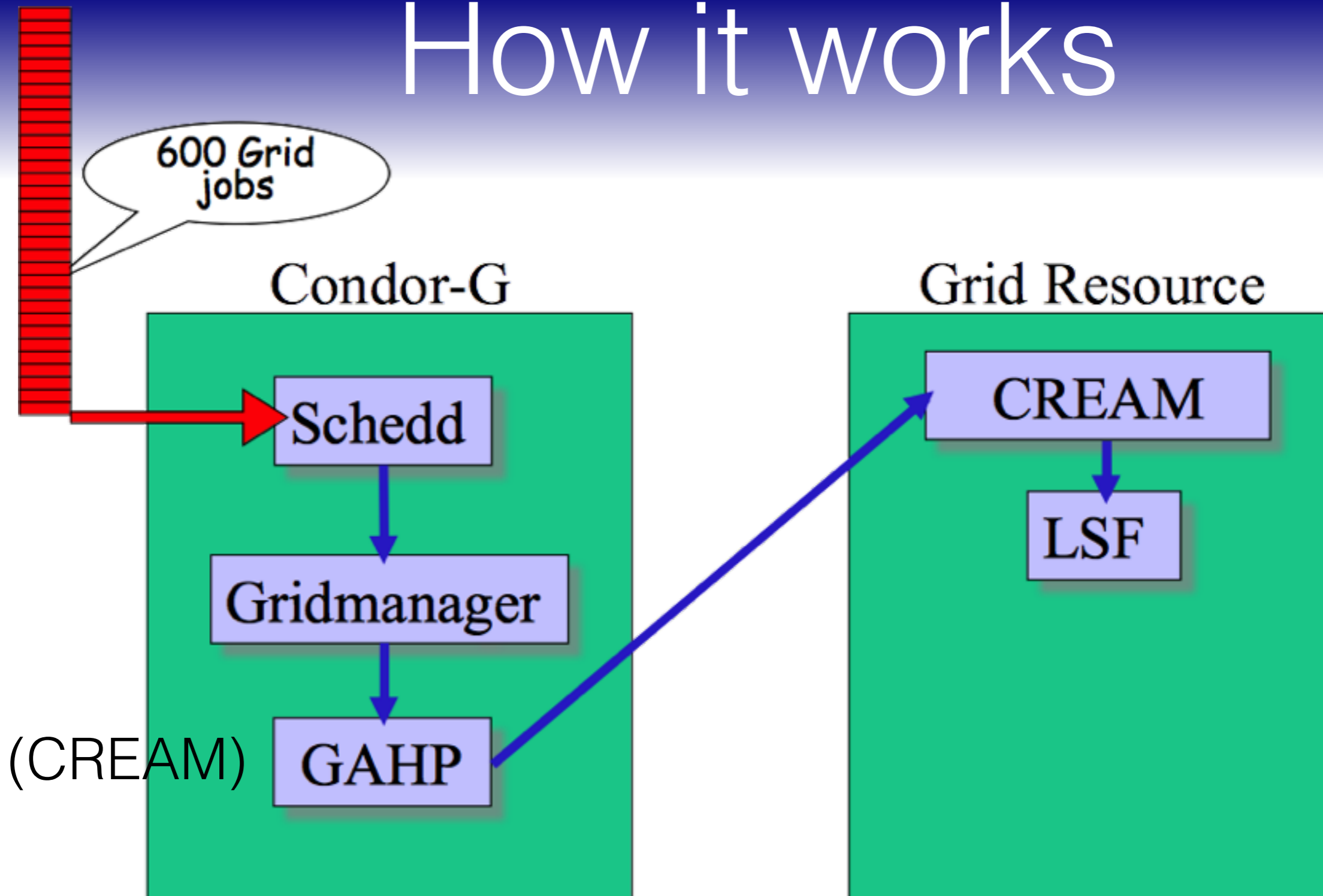
How it works



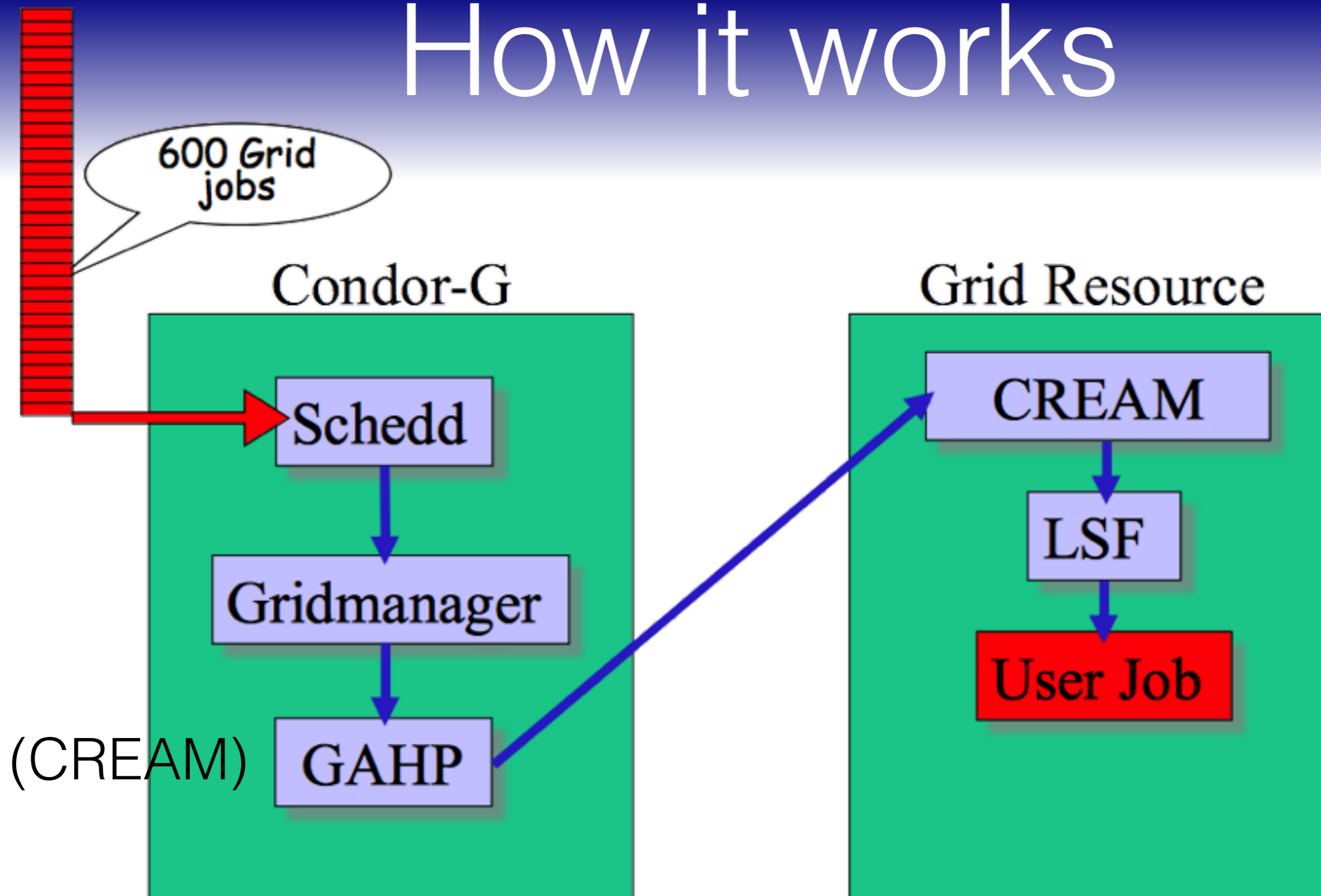
How it works



How it works



How it works



Submit file fields

HTCondor CE

- Format:

```
Universe = grid
Grid_Resource = condor <hostname> <hostname>:<port>
+<submit_attr> = <submit_attr_val>
```

- submit attributes target specific resources, can be added directly to submit file as custom classad attrs

- Example:

```
Universe = grid
Grid_Resource = condor osg-gw-2.t2.ucsd.edu osg-gw-2.t2.ucsd.edu:9619
+maxMemory = 16384
+xcount = 8
```


CREAM

- Format:

```
Universe = grid  
Grid_Resource = cream <hostname>:<port>/cream-<batch>-<queue>  
cream_attributes = <submit_attr> = <submit_attr_val>; ...
```

- submit attributes must be set in cream_attributes

- Example:

```
Universe = grid  
Grid_Resource = cream ce07.pic.es:8443/cream-pbs-mcore_sl6  
cream_attributes = WholeNodes = False; HostNumber = 1; CPUNumber = 8
```

NorduGrid

- Format:

```
Universe = grid  
Grid_Resource = nordugrid <hostname>  
nordugrid_rsl = (<submit_attr>=<submit_attr_val>)...
```

- submit attributes must be set in nordugrid_rsl in globes rsl format

- Example:

```
Universe = grid  
Grid_Resource = nordugrid arc-ce01.gridpp.rl.ac.uk  
nordugrid_rsl = (count=8)(memory=3072)(runtimeenvironment=ENV/GLITE)
```

Credential Management

- Condor-G requires X509 grid cert proxies for authentication
- X509 proxy path may be explicitly specified in submit file:

```
X509UserProxy = /home/einstein/other/proxy
```

- Proxy may expire before jobs finish executing
 - When a new proxy is available, Condor will forward the renewed proxy to the job

HELD Status

- Jobs will be held when Condor-G needs help with an error
 - On release, Condor-G will retry
- The reason for the hold will be saved in the job ad and user log

Debugging Held Jobs

```
condor_q -held
161.0 jfrey 2/13 13:58 CREAM_Delegate
  Error: Received NULL fault;

cat job.log
012 (161.000.000) 02/13 13:58:38 Job was held.
      CREAM_Delegate Error: Received NULL fault; the
      error is due to another cause...

condor_q -af HoldReason
CREAM_Delegate Error: Received NULL fault; the error is
  due to another cause...
```

Common Errors

- Authentication
 - Hold reason may be misleading
 - User may not be authorized by CE
 - Condor-G may not have access to all Certificate Authority files
 - User's proxy may have expired
- CE no longer knows about job
 - CE admin may forcibly remove job files
 - Condor-G is obsessive about not leaving orphaned jobs
 - May need to take extra steps to convince Condor-G that remote job is gone

The End

The HTCondor Project (Established '85)

- Research and Development in the Distributed High Throughput Computing field
- Team of ~35 faculty, full time staff and students
 - Face software engineering challenges in a distributed UNIX/Linux/NT environment
 - Are involved in national and international grid collaborations
 - Actively interact with academic and commercial entities and users
 - Maintain and support large distributed production environments
 - Educate and train students

Pointers

- HTCondor Home Page
<http://research.cs.wisc.edu/htcondor/>
- HTCondor Manual
<http://research.cs.wisc.edu/htcondor/manual/current/>
- Support
htcondor-users@cs.wisc.edu
htcondor-admin@cs.wisc.edu