CoG Kit Overview

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- Grids provide the means of sharing resources as part of virtual organizations with appropriate sharing rules.

- The Globus Toolkit provides the means of developing services and applications that can utilize the Grids.

- The DOE Science Grid provides an actual Grid which can be used by DOE scientists.

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- ## **PROBLEM**
  - **Many application developers and advanced software designers desire to program the Grid in higher level frameworks they are familiar with. Current Grid toolkits are not well supported in such frameworks.**

- ## **SOLUTION**
  - **The SciDAC CoG Kit project integrates Grid software based on the Globus Toolkit and a commodity framework such as Java and Python.**

- CoGs are more than just an interface to the Globus Toolkit

- CoGs allow Grid programmers to use the *Commodity Technologies* AND the *Grids* advantages
  - Example: Event and exception model of Java
  - Example: SWIG wrappers in Python for dusty deck support.

- Thus, CoGs are not just an API but provide access to the Commodity *Framework*

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- Easier development of advanced Grid services

- Easier and more rapid application development

- Easier deployment of Grid services

- Code reuse and use of component repositories

- Use of Web services as part of the Grids

- Widespread use of the Grid

- **Deliver high-quality CoG Kits for Java and Python**
- **Provide access to basic Grid services:**
- **- GRAM, MDS, security, GridFTP, GSI**
- **- Replica Catalog, co-scheduling**

- **Develop composable components:**
  - Develop guidelines for component development

- **- Design and implement component hierarchies**

- **- Develop a component repository**
- **Integrate Web and Grid services**

- Projects
  - We are working closely with the Globus Project. We also work with a variety of major funded applications through SciDAC, NSF (e.g., DOE Science Grid, Earth Systems Grid), and NASA IPG.

- Tutorials
  - Various tutorials have been given

- Papers
  - At least 5 papers surrounding CoG activities have been submitted

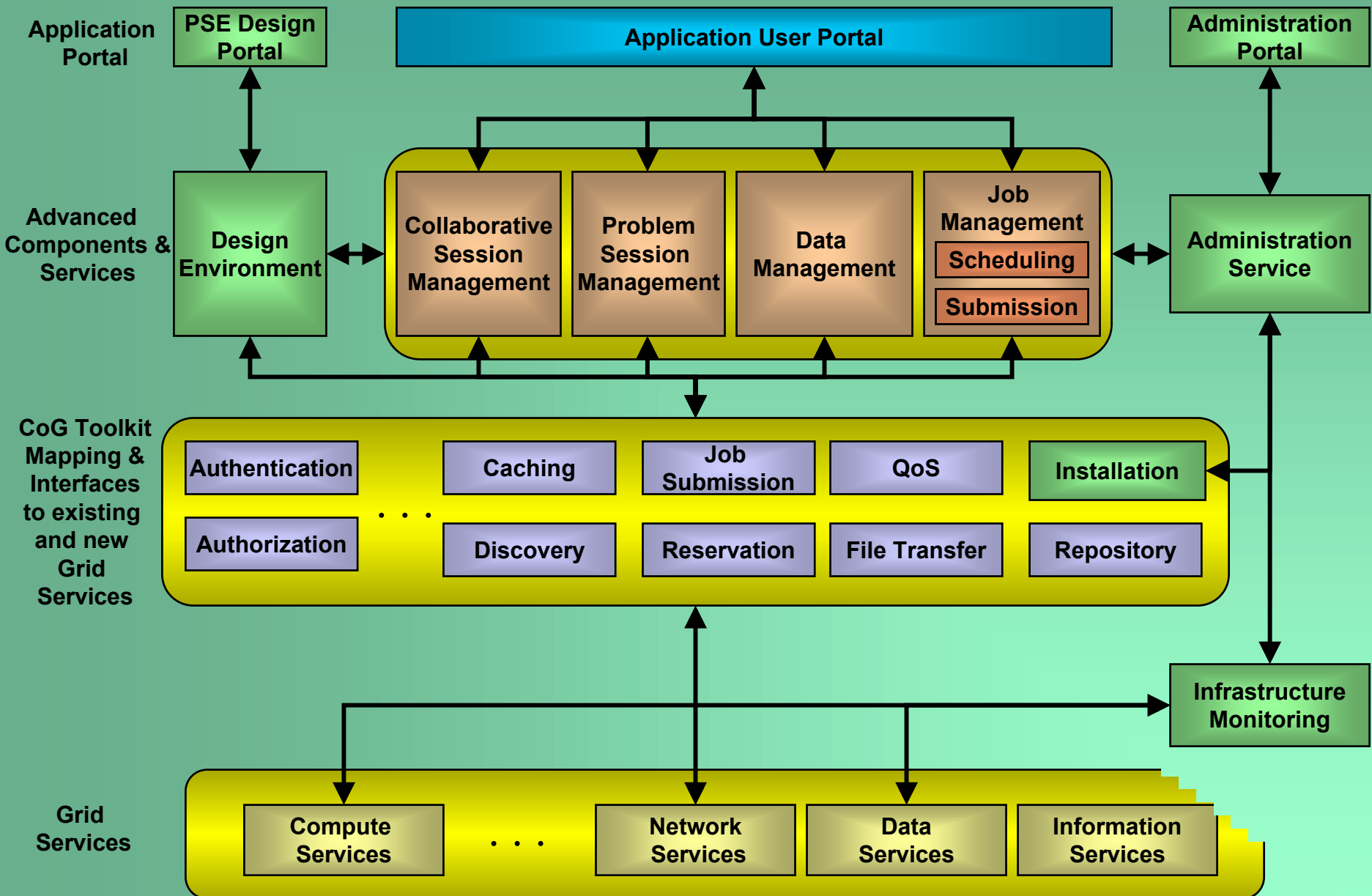# CoG Kits: Successively Filling a Gap
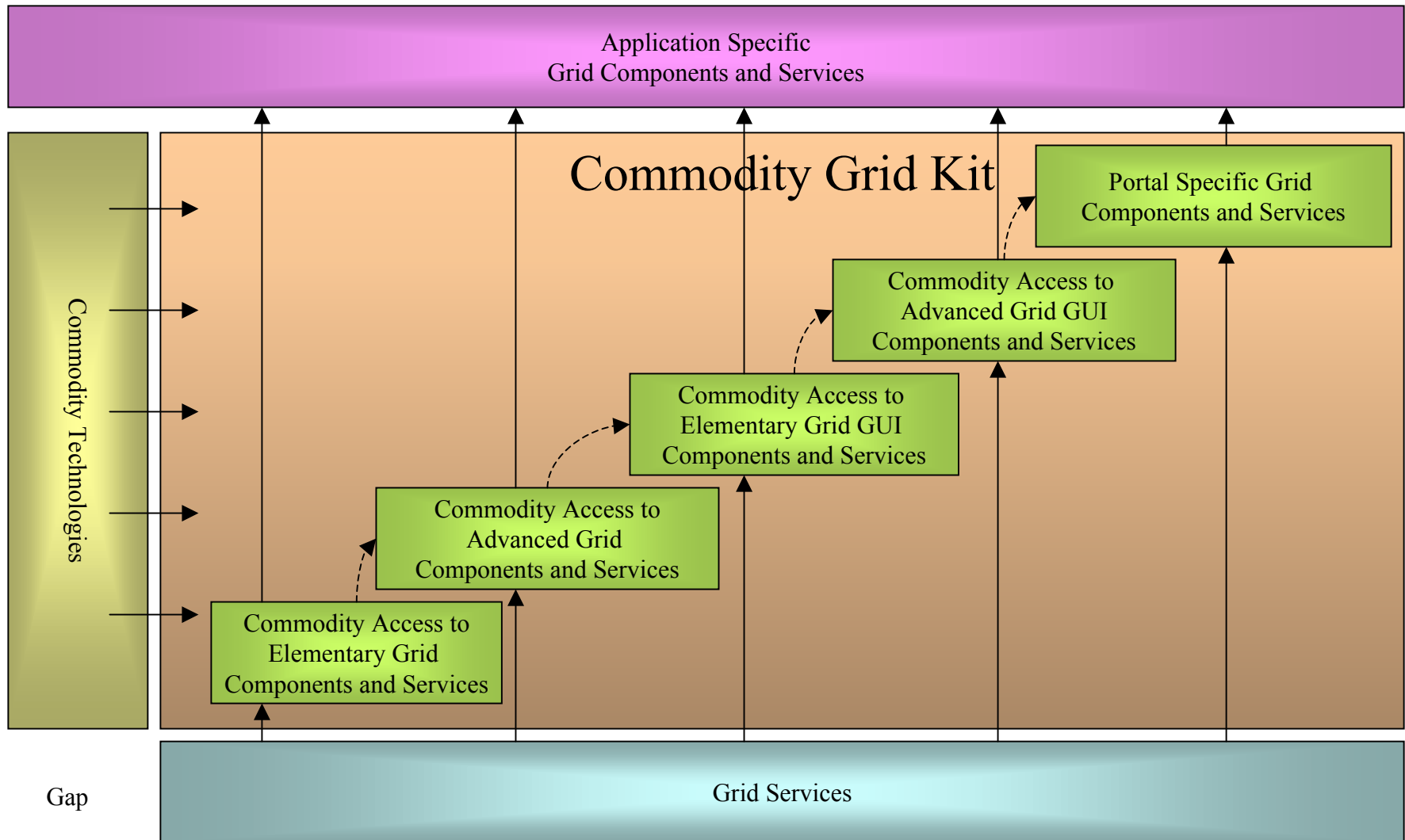
- The following architecture (next slide) cartoons the usefulness of, for example, Java CoG.

- Besides the possibility for developing advanced Grid/Web Services in Java we can use sophisticated development and deployment tools.

- Leveraging of from successful industry experience will broaden the use to other than science communities (example IBM)
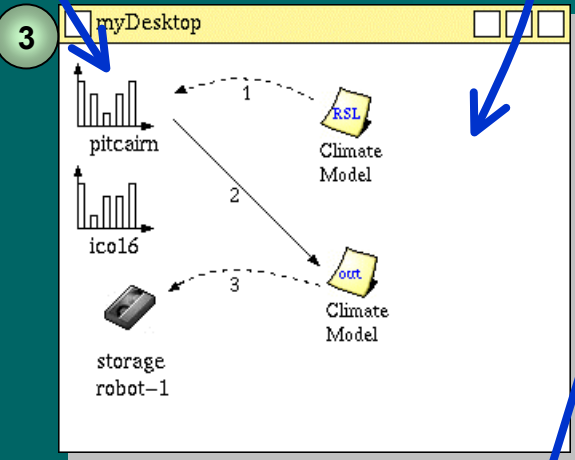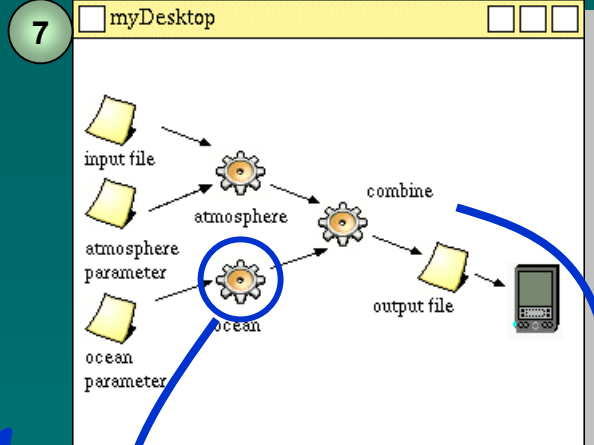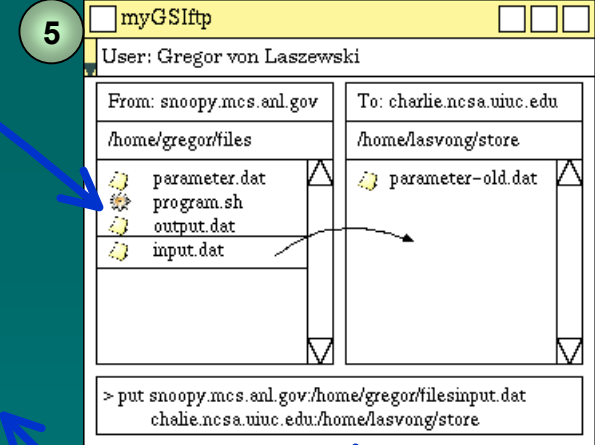
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CoG Kit Portal Architecture

Application Portal

PSE Design Portal

Application User Portal

Administration Portal

Advanced Components & Services

Design Environment

Collaborative Session Management

Problem Session Management

Data Management

Job Management
- Scheduling
- Submission

Administration Service

CoG Toolkit Mapping & Interfaces to existing and new Grid Services

Authentication

Caching

Job Submission

QoS

Installation

Authorization

Discovery

Reservation

File Transfer

Repository

Infrastructure Monitoring

Grid Services

Compute Services

. . .

Network Services

Data Services

Information Services

- Focus is to develop crossplatform and framework independent services

- Nevertheless, CoGs provide the possibility to develop sophisticated crossplatform independent user Interfaces that are intuitive to use by the non experts.

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2 myDesktop

pitcairn
1
RSL
Climate Model
2
ico16
3
out
Climate Model
storage robot-1

5 myGSIftp

User: Gregor von Laszewski

From: snoopy.mcs.anl.gov	To: charlie.ncsa.uiuc.edu
/home/gregor/files	/home/lasvong/store
parameter.dat	parameter-old.dat
program.sh	
output.dat	
input.dat	

> put snoopy.mcs.anl.gov:/home/gregor/filesinput.dat
chalie.ncsa.uiuc.edu:/home/lasvong/store

7 myDesktop

input file
atmosphere
combine
atmosphere parameter
ocean
output file
ocean parameter

3 myDesktop

pitcairn
1
RSL
Climate Model
2
ico16
3
out
Climate Model
storage robot-1

1 myDesktop

Name: Gregor von Laszewski

Pass Phrase: ********

Key: /home/laszewsk/.globus/cert.pem

Authenticate   Cancel

8 myDesktop

Application-Menu

Model   = ppm
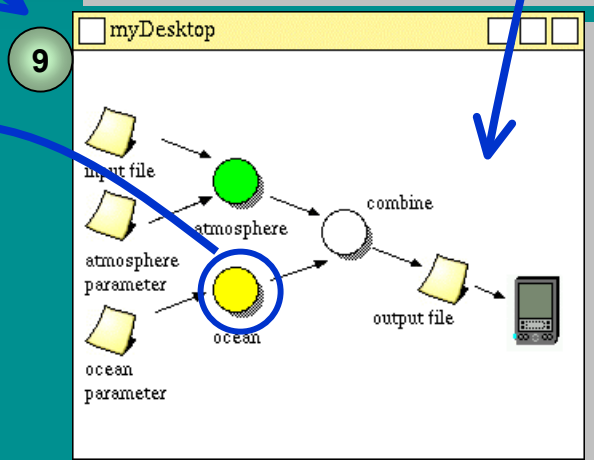Variable = temperature
Unit   Celsius
....

Submit   Cancel

4 myMonitor

Machine	Query	gsiftpd	ping	Service Globus gatekeeper	f77
snoopy.mcs.anl.gov	●	●	●	●	●
charlie.mcs.anl.gov	●	●	●	●	●
linus.ncsa.uiuc.edu	●	●	●	●	●
sally.isi.edu	●	●	●	○	●

> add Query = (gsiftpd & ping & GlobusGatekeeper & f77)
> echo Query
> snoopy.mcs.anl.gov

6 myDesktop
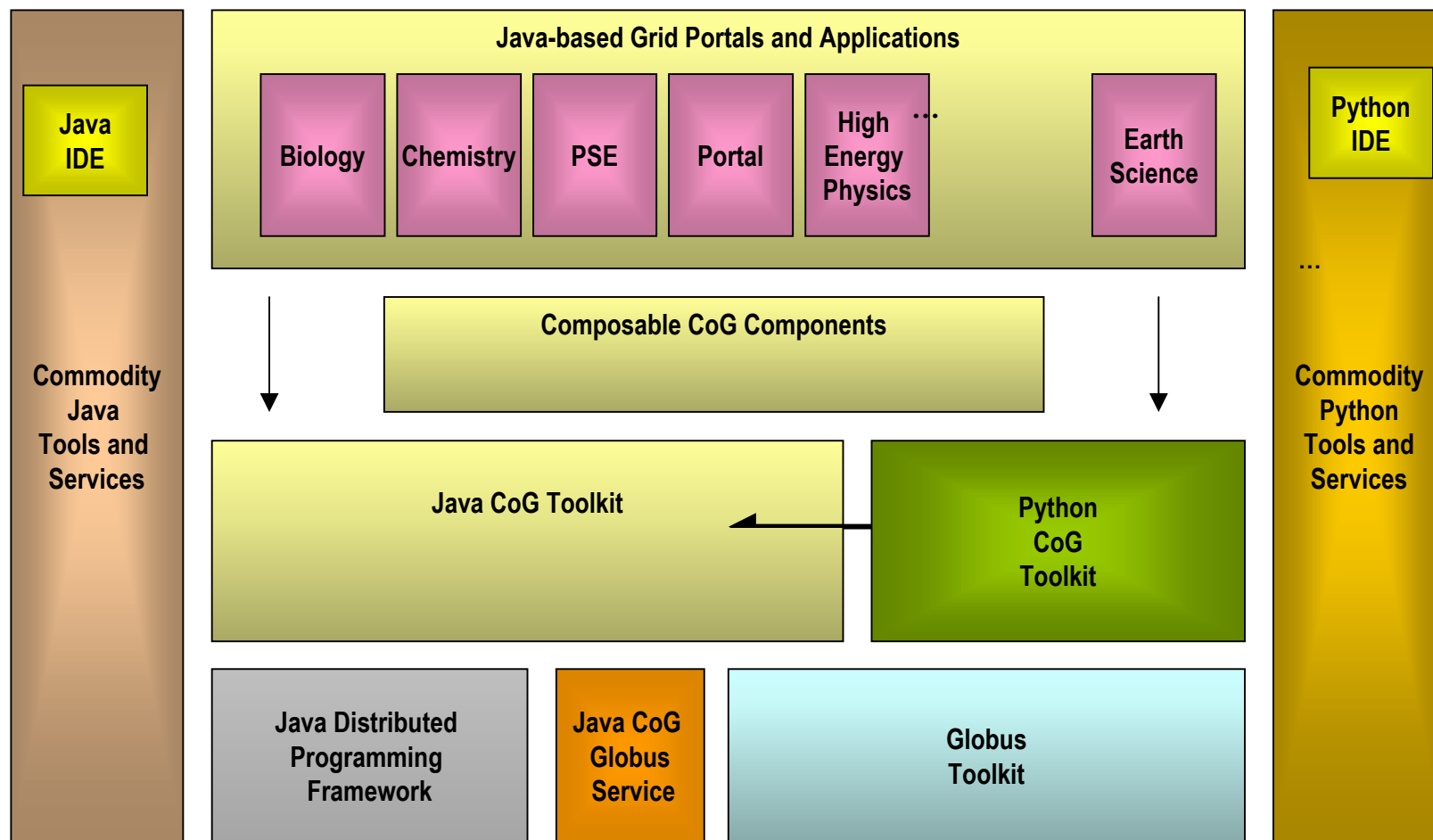
Job	Status	Machine	Owner
cllimate	●	pitcairn	gregor
ocean	●	ico16	gregor
atmosphere	●	denali	gregor
display	○	yukon	gregor
pager	●	palmpilot31	gregor
moisture	●	toscana	gregor

9 myDesktop

input file
atmosphere
combine
atmosphere parameter
ocean
output file
ocean parameter

The CoG Kit Overview

Java-based Grid Portals and Applications

Biology | Chemistry | PSE | Portal | High Energy Physics | ... | Earth Science

Java IDE

Commodity Java Tools and Services

Python IDE

Commodity Python Tools and Services

Composable CoG Components

Java CoG Toolkit

Python CoG Toolkit

Java Distributed Programming Framework

Java CoG Globus Service

Globus Toolkit

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Subset of Projects using CoGs
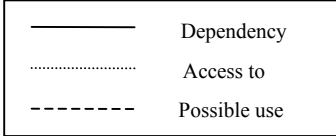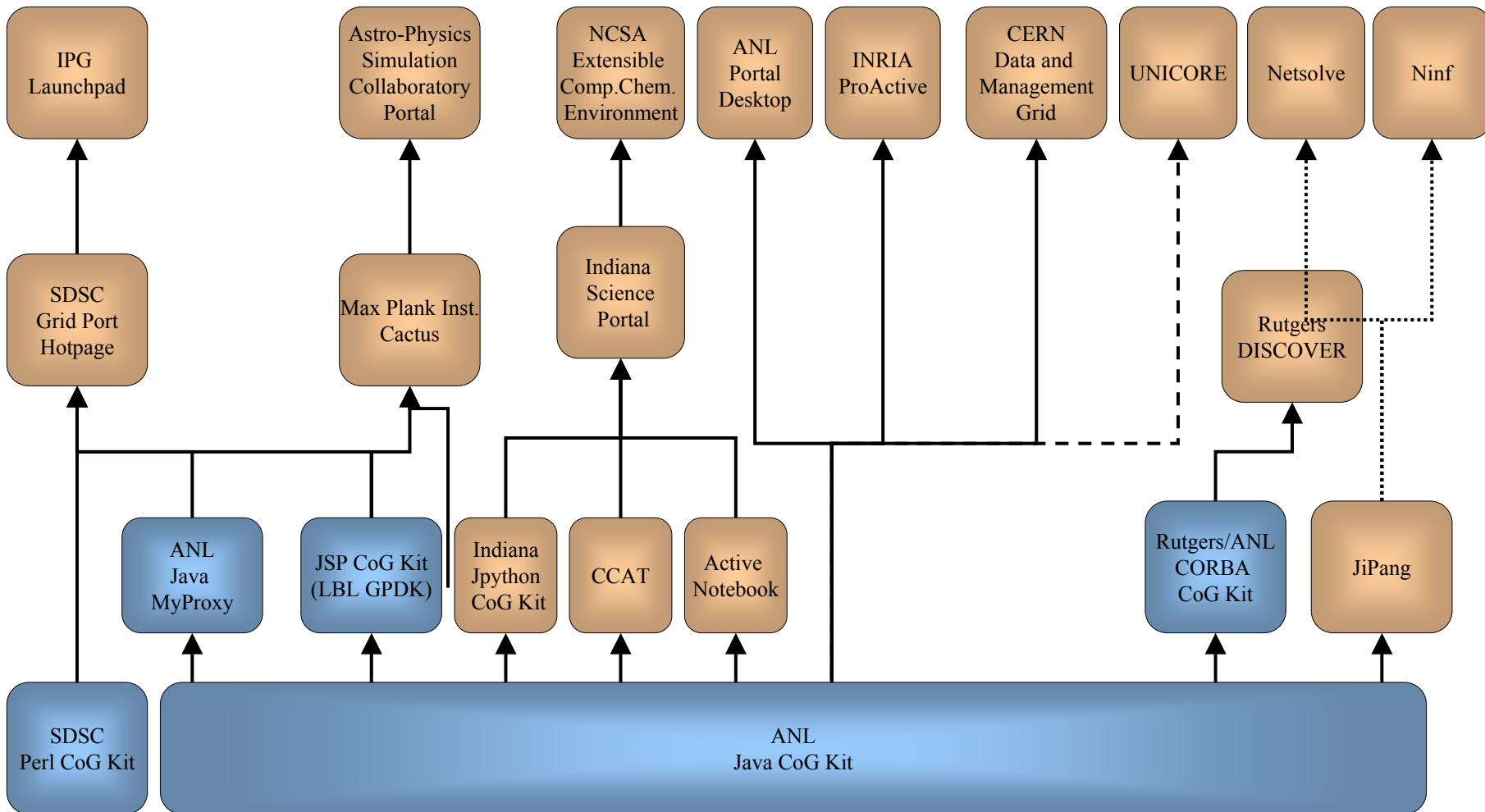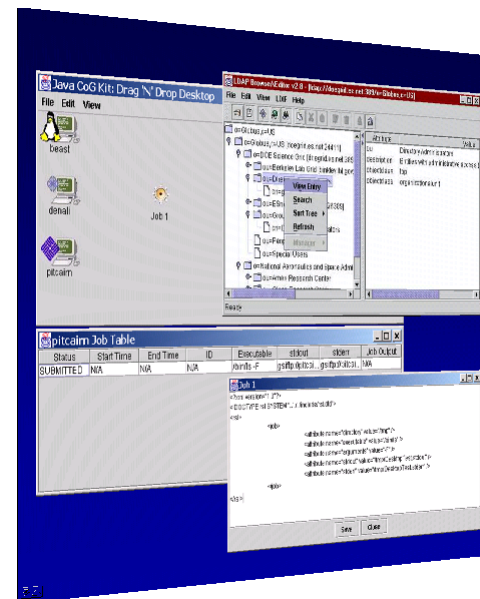
- Demonstrated that
  - sophisticated interfaces are possible
  - Integration with Windows Software is possible
  - Installation can be performed by non experts
 - A good way to develop advanced science portals

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http://www.globus.org/cog
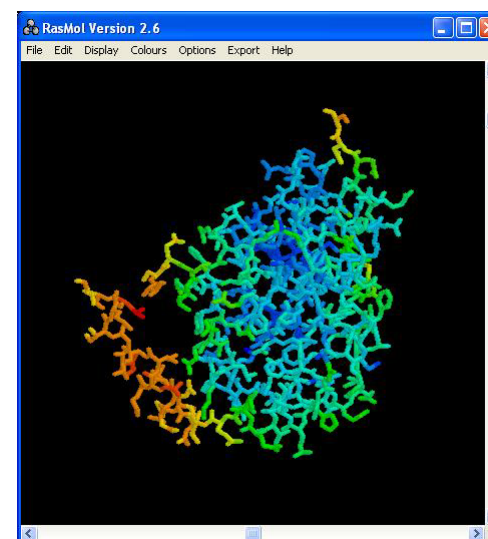
Expresso Toolkit for Scientific Modeling

- Argonne Midwest Regional Climate Modeling Group

- Provides convenient access to various Climate models that can be invoked on various Grid Compute resources
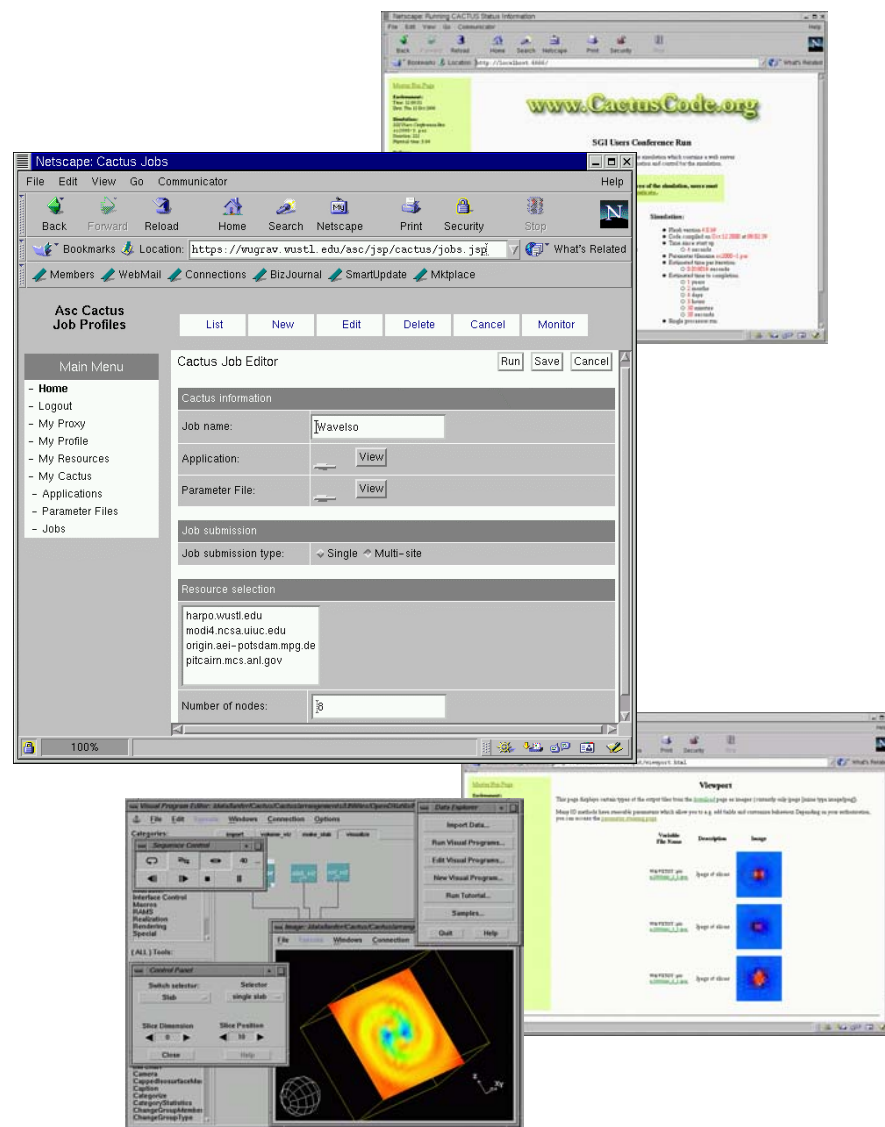
- It is used for research

- It uses CoG

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http://www.globus.org/cog
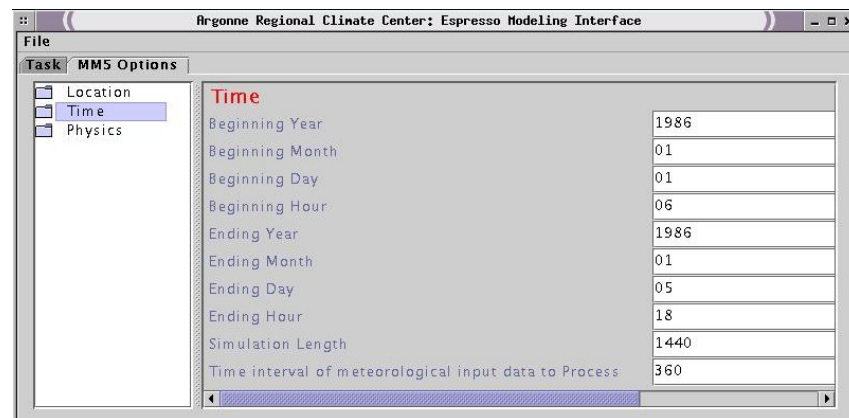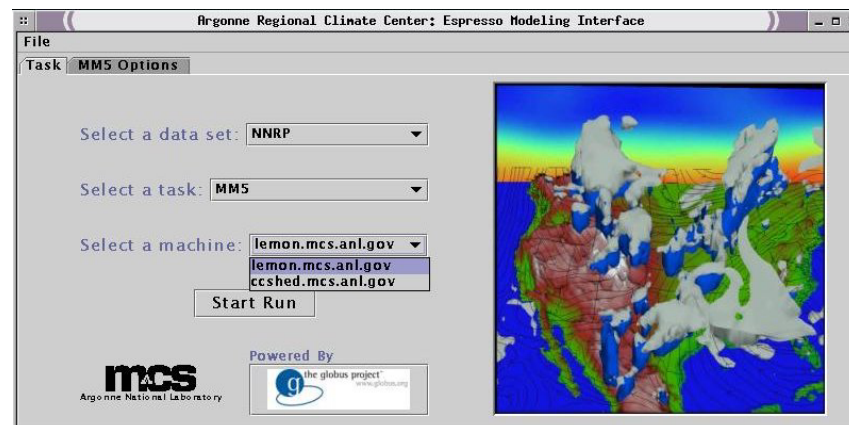
Astrophysical Collaboratory

- ## Enables scientists to
  - Develop code collaboratively
  - Run experiments collaboratively
- ## Uses Cactus, Globus Toolkit
- ## The portal is implemented on top of CoG

Acknowledgement

- The Java CoG Effort is part of the Globus Project

- The CoG Kit is funded through SciDAC with the DOE

- Some application portals are supported by NSF

- More information can be found at
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