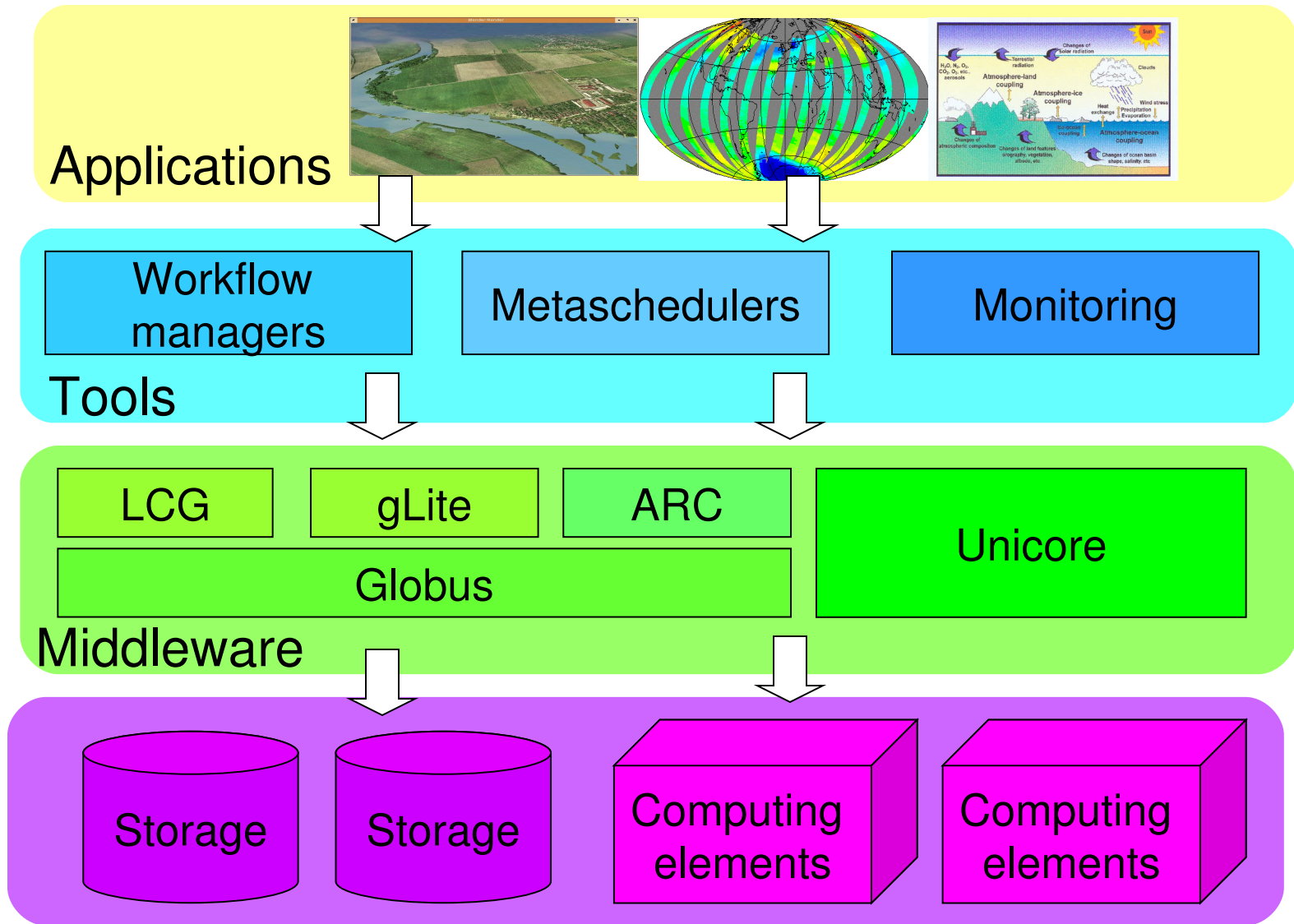


Overview of middleware and tools

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- **Middleware:**
 - Same middleware over whole infrastructure
 - Installed and managed by admins of sites
 - Optimized for system-wide objectives (e.g. site utilization, ...)
- **Tools**
 - Individual for every applications, rich choice
 - Usually installed on single machine
 - Operate with resources in infrastructure via middleware
 - Usually can be installed by users (without root privilege)
 - Optimized for application objectives (e.g. response time, ...)

- **Globus Toolkit 2.x**
 - Provide basic Grid functionalities
 - Security infrastructure: authentication, authorization, delegation (GSI)
 - Data transfer: GridFTP
 - Resource management: GRAM
 - Monitoring
 - Usually used as underlayer of other Grid middleware (LCG, gLite, ARC)

- **Globus Toolkit 4.x**
 - New implementation of Globus
 - OGSA architecture, WSRF standard
 - Many functions from GT2 are re-implemented in WS scheme (e.g. GRAM -> WS-GRAM)
 - Adding new components for new functionalities (meta scheduler GridWay, data access OGSA-DAI, ...)

- **LCG**
 - Support for resource brokering
 - Support for simple workflow (based on DAGMan)
 - Support for virtual organization (VOMS)
 - Used in old EGEE infrastructure, int.eu.grid
 - Slowly replaced by gLite

- **gLite**
 - Web service approach
 - Performance improvement
 - Job collection
 - Job monitoring
 - Current middleware in EGEE

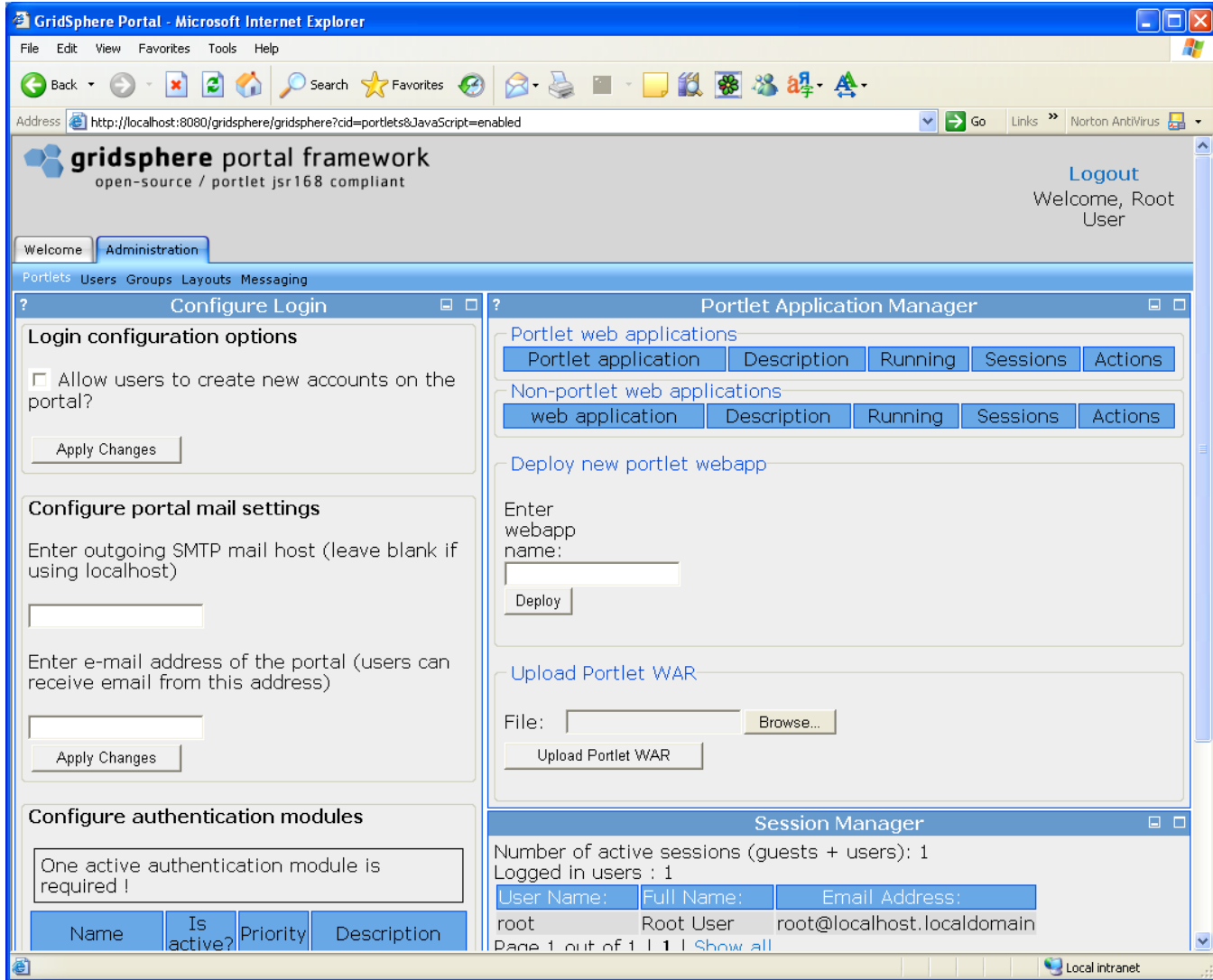
- **ARC**
 - Using modified GridFTP for job submission
 - Distributed architecture
 - Simple resource brokering on user interface
 - Used in NorduGrid infrastructure

- **Unicore**
 - Provide functionalities for creating Grid from supercomputing centers (security, resource management, monitoring)
 - Also follow OGSA and WSRF
 - Used in DEISA

- **Manage jobs with data dependence**
 - Usual sequence: data retrieval, pre-processing (data conversion, mining), main computation, post-processing (result analysis, visualization)
 - Combination of several simulation: e.g. meteorology-hydrology-hydraulics
- **A lot of implementations exist: DAGMan, Pegasus, Taverna, Karajan, ...**
- **Can be stand-alone or integrated to middleware/portal**
 - Stand-alone: Pegasus, Karajan, GridAnt, ...
 - Integrated with middleware/scheduler: DAGMan in LCG/gLite, GridWay
 - Integrated with portals: P-GRADE, K-Wf Grid
- **Most of workflow managers use DAG for representation of workflow**
 - DAGMAN, Karajan, ...
 - Other representation: Petri net (K-Wf Grid), BPEL
- **Some have also graphical interface: portal or stand-alone GUI**

- **Aim: Manage large number of small jobs**
 - parametric study,
 - data parallel: image processing
- **Working on master-worker scheme:**
 - Worker jobs are submitted to different CEs via middleware
 - Master runs on UI or as stand-alone service and sends tasks to workers
- **Implementations: DIANE, DIET**
- **Advantages:**
 - Can improve response time:
 - Task execution can start when the first worker starts
 - Worker jobs on faster machines will execute larger number of tasks
 - Give partial fault-tolerance
 - If some worker jobs fail, the rest can continue execute tasks

- **Usually used as User Interface for applications**
 - Accessible from anywhere
 - Hide implementation details
 - Additional security
 - Useful for demonstration, can be combined with visualization
- **Several frameworks and ready-to-use portlets available**
 - Gridsphere/GridPortlets
 - P-GRADE
 - GENIUS
- **Application developers usually customize portals for end-users**



GridSphere Portal - Microsoft Internet Explorer

Address: http://localhost:8080/gridsphere/gridsphere?cid=portlet&JavaScript=enabled

gridisphere portal framework
open-source / portlet jsr168 compliant

Logout
Welcome, Root User

Welcome Administration

Portlets Users Groups Layouts Messaging

Configure Login

Login configuration options

Allow users to create new accounts on the portal?

Apply Changes

Configure portal mail settings

Enter outgoing SMTP mail host (leave blank if using localhost)

Enter e-mail address of the portal (users can receive email from this address)

Apply Changes

Configure authentication modules

One active authentication module is required !

Name	Is active?	Priority	Description

Portlet Application Manager

Portlet web applications

Portlet application	Description	Running	Sessions	Actions

Non-portlet web applications

web application	Description	Running	Sessions	Actions

Deploy new portlet webapp

Enter webapp name:

Deploy

Upload Portlet WAR

File: Browse...

Upload Portlet WAR

Session Manager

Number of active sessions (guests + users): 1
Logged in users : 1

User Name:	Full Name:	Email Address:
root	Root User	root@localhost.localdomain

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Local intranet