VLAM-G: A Grid-based Virtual Laboratory

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Outline

- Introduction
- Objectives
- VLAM-G Components
- VLAM-G Experiments
- VLAM-G RunTime System
- Conclusions
VLAM-G
Virtual Laboratory AMsterdam

A collaborative analysis environment for applied experimental science
Objectives

- Designing **middleware**: bridge gap between **Grid-** and **application-layer**
- Enable VLAM-G users to **define**, **execute**, and **monitor** their experiments
- Provide to VLAM-G users:
  - location independent experimentation,
  - familiar experimentation environment
  - assistance during their experiments
- Easy way to bring new applications to the Grid
Why the VLAM-G project?

- The Grid deals only with raw data
  - A large number of potential applications require the manipulation of more than just raw data
- The Grid is just a bag of tools
  - The development of grid enabled applications require extensive knowledge in programming
VLAM Functional View

Application Domains

- Bio Medicine
  - MRI Scanner
- Material Ana
  - Micro beam
  - FTIR, ...
- DNA Array
  - genome expression
- Others

VLAM Science Portal + Workbench

VLAM RTS

Grid Middleware
(Globus)

Grid Fabric
(Farms, microscope, etc.)
Experimental Workflow

Information gathering → Experimentation → Interpretation

Access to devices → Access to data → Access to information

Grid accessible infra: apparatus, systems, network
The VLAM Architecture
RTS DB

- Stores user support information:
  - experiment topology definitions
  - module descriptions
  - user information

- Provides cross-links to application annotations
- Based on object-oriented database technology
- Extends resource directories now used in Grid
Application Domain DB

- Characteristics of typical application

  Scientist(s) performing the experiment on:
  
  objects and preexisting information & data on which processes operate, using apparatus with specific properties
  
  - Resulting in new data and information

  A domain-specific flow of processes

Examples: Expressive, MACS, EFC, ...
Application Domain DB

- Characteristics of typical application

- A domain-specific **flow of processes**

Examples: *Expressive, MACS, EFC, ...*
Process Flow Template (PFT)

- Used as a blueprint for a specific type of experiments
- PFT is designed offline by the experts in each scientific domain
- It is the main interface used by the VLAM-G users to perform a specific experimentation in the VLAM-G environment.
- It Guides the user while performing the experiment.
MacsLab Experiment
VLAM-G Run Time System

∀ Features:
∀ Data-flow-like experiments with modules
∀ Control parameters & read state
∀ Interact with the Grid layer

∀ Interaction with VLAM-G RTS?
∀ Module developers: API
∀ End-users: None (transparent)
Status of the VLAM-G Prototype

∀ VLAM-G RunTime System
   ∀ Module skeleton and manager available
   ∀ Parameter control available
   ∀ Communication via GridFTP
∀ VLAM-G FrontEnd/GUI
   ∀ Experiment topology editor
   ∀ Process flow template editor
Current VLAM-G FrontEnd
Demo1: histogram
Demo3: MACSLab Exp
Demo4: RMI Scan
Potential Research issues

• Resource Management on the Grid
  • One Ph.D student is going to study this topic in detail
• Security issues on the Grid
• Federating Data on the Grid
Conclusions

∀ VLAM-G: a science portal for exp. analysis
∀ Workflow support for Bio-informatics, Materials Science and Biomedical Simulation & Visualisation
∀ Seamless access to distributed resources
∀ Resource Management: based on Globus
∀ Content Management: VLAM-G middleware
∀ Current status: preparing the beta-release of the VLAM-G toolkit.
VLAM-G Front End
People (not comprehensive)

- Adam Belloum
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- Gert Eijkel
- Zeger Hendrikse
- Dmitry Vasunin
- Ersin Kaletas
- Vladimir Korkhov
- Robert Belleman
- Hakan Yakali
- Hamideh Afsarmanesh
- Timo Breit
- Peter Sloot
- Ron Heeren
References

∀ Globus: http://www.globus.org/

∀ Globus doc:
http://www.globus.org/documentation/

∀ Globus UvA:
http://www.science.uva.nl/~zegerh/globus/

∀ Globus papers: contact me for Globus retreat 2001 papers and slides

∀ VLAM-G: http://www.dutchgrid.nl/VLAM-G/

∀ VLAM-G paper: bottom of above webpage