The NASA STEP Testbed

Pan Galactic Engineering Framework (PGEF)

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PGEF Overview

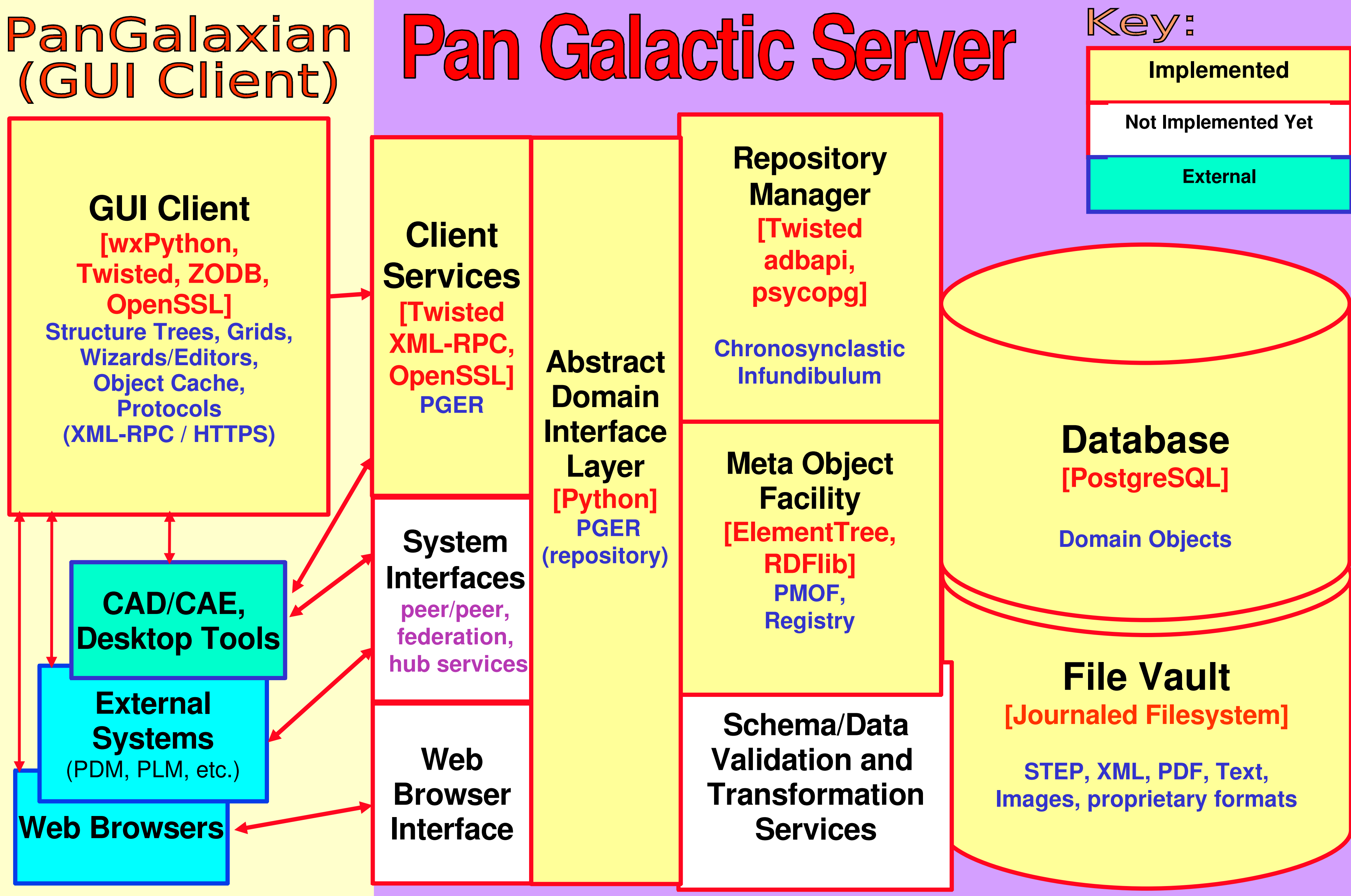
- **A framework for systems knowledge integration, systems engineering, and collaboration**
  - **Server: VGER** (Virtual Galactic Entropy Reverser)
  - **Client: PanGalaxian**
- **Goals:**
  - Make **STEP** accessible to enterprise developers
  - Integrate **STEP**, **UML**, and **OWL** data, tools, and capabilities
  - Provide a robust, scalable, extensible, open-source, standards-based platform for engineering tool interoperation and knowledge integration
- **Implemented in Python (http://python.org)**

PGEF Ingredients

PGEF is being built using robust open-source frameworks and libraries:

- PostgreSQL (http://postgresql.org) - RDBMS
- Twisted (http://twistedmatrix.com) - asynchronous networking framework
- wxPython (http://wxpython.org) - cross-platform GUI toolkit
- Elementtree (http://effbot.org/downloads/#ElementTree) - XML library
- RDFlib (http://rdflib.net/latest/) - RDF library (OWL)
- OpenSSL (http://www.openssl.org) - Secure Sockets Layer (protocol encryption)
- Zope Interface (http://www.zope.org/Products/ZopeInterface) - interface metaobjects
- Zope Object Database (http://www.zope.org/Products/StandaloneZODB) - client object cache
- SimpleParse (http://simpleparse.sourceforge.net/) - a fast, regexp-based tagging parser
- PyParsing (http://pyparsing.wikispaces.com/) - a package of intelligent parsing objects (good at complex and/or recursively structured grammars)

Pan Galactic Engineering Framework



PanGalaxian (GUI Client)

Pan Galactic Server

Key:

Implemented

Not Implemented Yet

External

GUI Client
[wxPython, Twisted, ZODB, OpenSSL]
Structure Trees, Grids, Wizards/Editors, Object Cache, Protocols (XML-RPC / HTTPS)

CAD/CAE, Desktop Tools

External Systems
(PDM, PLM, etc.)

Web Browsers

Client Services
[Twisted XML-RPC, OpenSSL]
PGER

System Interfaces
peer/peer, federation, hub services

Web Browser Interface

Abstract Domain Interface Layer
[Python]
PGER (repository)

Repository Manager
[Twisted adbapi, psycopg]
Chronosynclastic Infundibulum

Meta Object Facility
[ElementTree, RDFlib]
PMOF, Registry

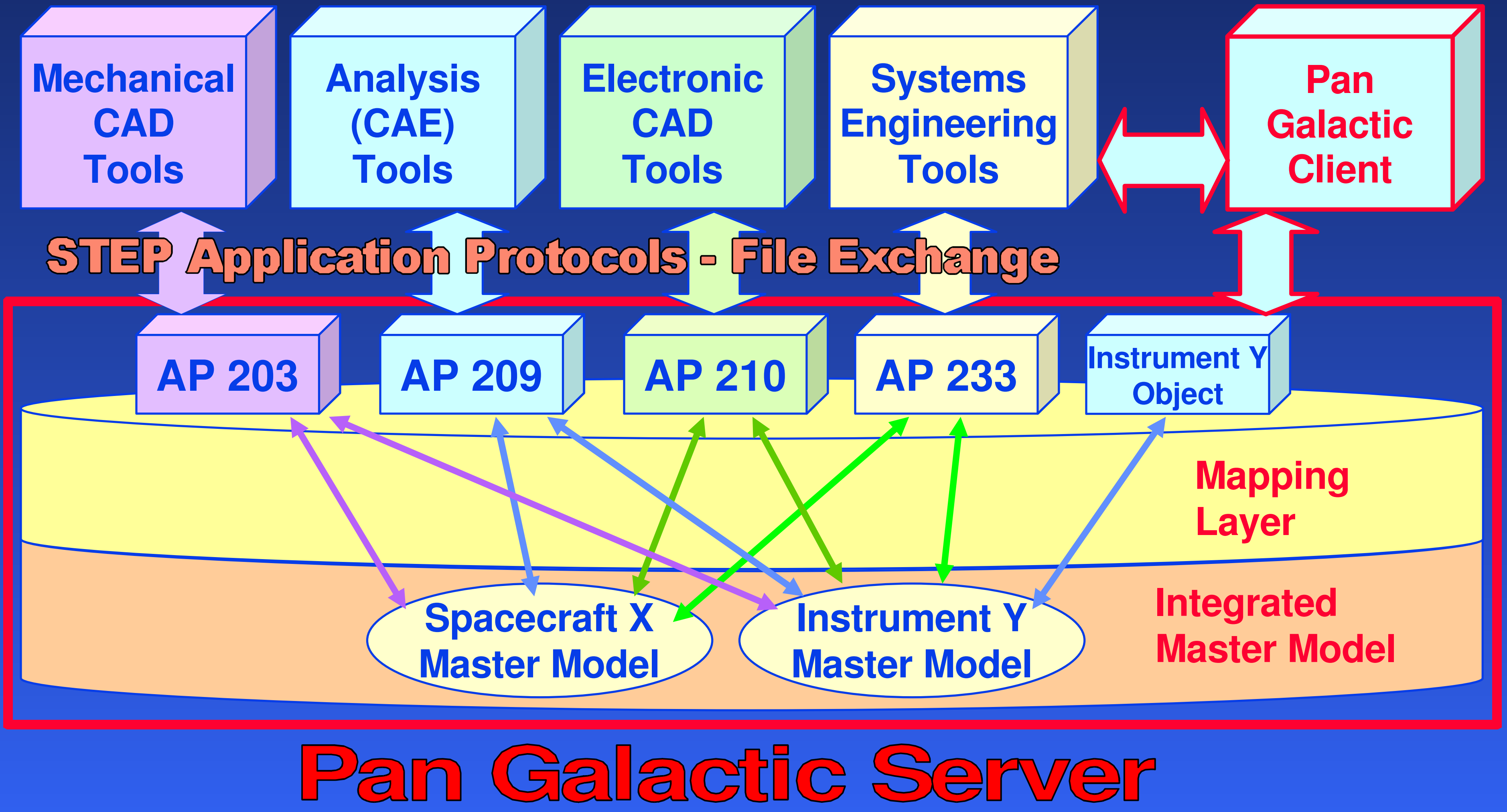
Schema/Data Validation and Transformation Services

Database
[PostgreSQL]
Domain Objects

File Vault
[Journaled Filesystem]
STEP, XML, PDF, Text, Images, proprietary formats

PGEF Model-Based Enterprise

Master Model Integration Using STEP



PGEF Core Ontology

- **A generic metamodel + a systems domain ontology**
  - In STEP parlance, an “ARM-like” schema
  - Both an “Upper Ontology” (Class, Property, DataSet) and a Domain Ontology
  - PGEF Core Classes are intended to be common to all engineering domains
- **Meta: PGEF Ontology, ObjectSchema, Property**
  - PGEF Ontology ~ [Express Schema, OWL Ontology, UML Model]
  - PGEF ObjectSchema ~ [Express Entity, OWL Class, UML Class]
  - PGEF Property ~ [Express Attribute, OWL Property, UML Attribute]
- **Versioned Objects: Parts, Models, Documents**
  - A Versioned Object can have any number of Representations and Files
  - Different Representations for different viewers, editors, exchanges, etc.
- **Models**
  - A Model can represent a discipline “view” of a Part (e.g., CAD/CAE model)
  - But is also an independently managed entity unto itself
- **Parts and Models**
  - A Part can have any number of Models (“views”) - Mechanical, Electrical, etc.
  - Assemblies consist of Models (physical instances are considered Models)

Current PanGalaxian Capabilities

- **General**
  - Local persistent cache, implemented using Zope Object Database (ZODB)
  - User preference settings
  - Remote repository selection from list
- **Communications and Security**
  - HTTP Basic Authentication
  - SSL encryption
  - XML-RPC interface to PGEF Repository (“PGER”)
  - Repository Service interface operations (possible area for “standardization”):
    - get object(s)
    - add object(s)
    - search for objects by criteria
- **Structured Product Documents**
  - Creation, Editing, Publishing (PDF, simple XML)
  - Initial document types: Alerts, Advisories (documentation of part problems)
- **Parts and Models**
  - Assembly tree display
  - Simple assembly mock-up
  - Editing of simple PDM data

Current VGER Capabilities

- **Object-Relational Mapping**
  - PGEF Objects are mapped into a relational database backend (PostgreSQL)
  - Robust and scalable storage capability
- **Communications and Security**
  - XML-RPC over HTTPS is currently used between client and server
  - Userids and passwords are maintained in the database (passwords are stored securely in 160-bit SHA-1 encrypted digest form)
- **XML-RPC Repository Interface**
  - Ease of interop -- **XML-RPC** is widely available (C, Java, Perl, Python, etc.)
  - **XML-RPC** is simple; useful for prototyping and experimentation
  - Interface (procedure calls):
    - **Get Objects**
      - get a collection of objects, with referenced objects, etc.
    - **Add Objects**
      - commit new objects to the repository, along with files, etc.
    - **Upload [file] (this is actually a CGI function)**
      - files are stored in structured "vault"; referenced from objects
    - **Checkout / Update / Commit**
      - CVS or SVN-like operations on Projects and/or sets of objects
    - **Search**
      - search for objects by class (Part, Model, Document) and attribute values
      - search can include all subclasses of the specified class

Additional Target Capabilities for PGEF 1.0 Release

- **VGER and PanGalaxian**
  - [****] Application object types definable by OWL ontology
  - [***] Administrative functions (add/modify/delete users and projects)
  - [**] EXPRESS model import (via XMI using the MEXICO EXPRESS metamodel)
  - [**] STEP data import
  - [*   ] UML / XMI data import
  - [*   ] QVT-style maps {AP203, AP209, AP210} <-> PGEF Ontology
  - [**] Unit tests, integration tests, and stress tests
  - [*   ] Basic role-and-class-based access control for repository objects
  - [*   ] Structured Product Document search (parameters + full-text)
- **PanGalaxian**
  - [**] Display of search results with “links” to related objects
  - [*   ] Asynchronous network interfaces (i.e., “non-blocking”) using Twisted

Key: [****] == “completed”

Target PGEF 1.1 Capabilities

- **Collaborative applications**
  - Collaborative structured object creation (documents, system models)
  - Real-time peer-to-peer collaborative object grid (“spreadsheet”)
- **Model creation, mapping, and integration tools (PanGalaxian)**
  - Basic ontology visualization and modeling canvas
  - QVT mapping creation and visualization canvas
  - EXPRESS, UML, XMI, and OWL (etc?) import and export
- **Interfaces to 3D viewers (PanGalaxian)**
  (e.g. Adobe 3D and other tools)
- **SysML modeling and import/export capability**
  (requirements, parameters, parts, systems)
- **Active notification service**
  - new project data, objects
  - events (changes/impacts) in subscribed areas of interest
    - new versions of versioned objects
    - analysis results
    - rule condition fulfillments

Future Target PGEF Capabilities

- **Systems Engineering Collaboration Environment**
  (shared systems modeling space and whiteboard)
- **Structured Product Document* Production Service**
  (Client with wizards, live repository links to models and validation)
- **Standard Model Library and Repository Services**
  (in-house and COTS parts and systems models for CAD/CAE/Sim.)
- **CAX Model Linkage, Generation, and Transformation**
  (Model parametric relationship tracking and validation)
- **Ontology, Knowledge, and Rules Management Services**
  (Rule definition, real-time validation and notification)
- **Long-Term Systems Knowledge Archiving Service**

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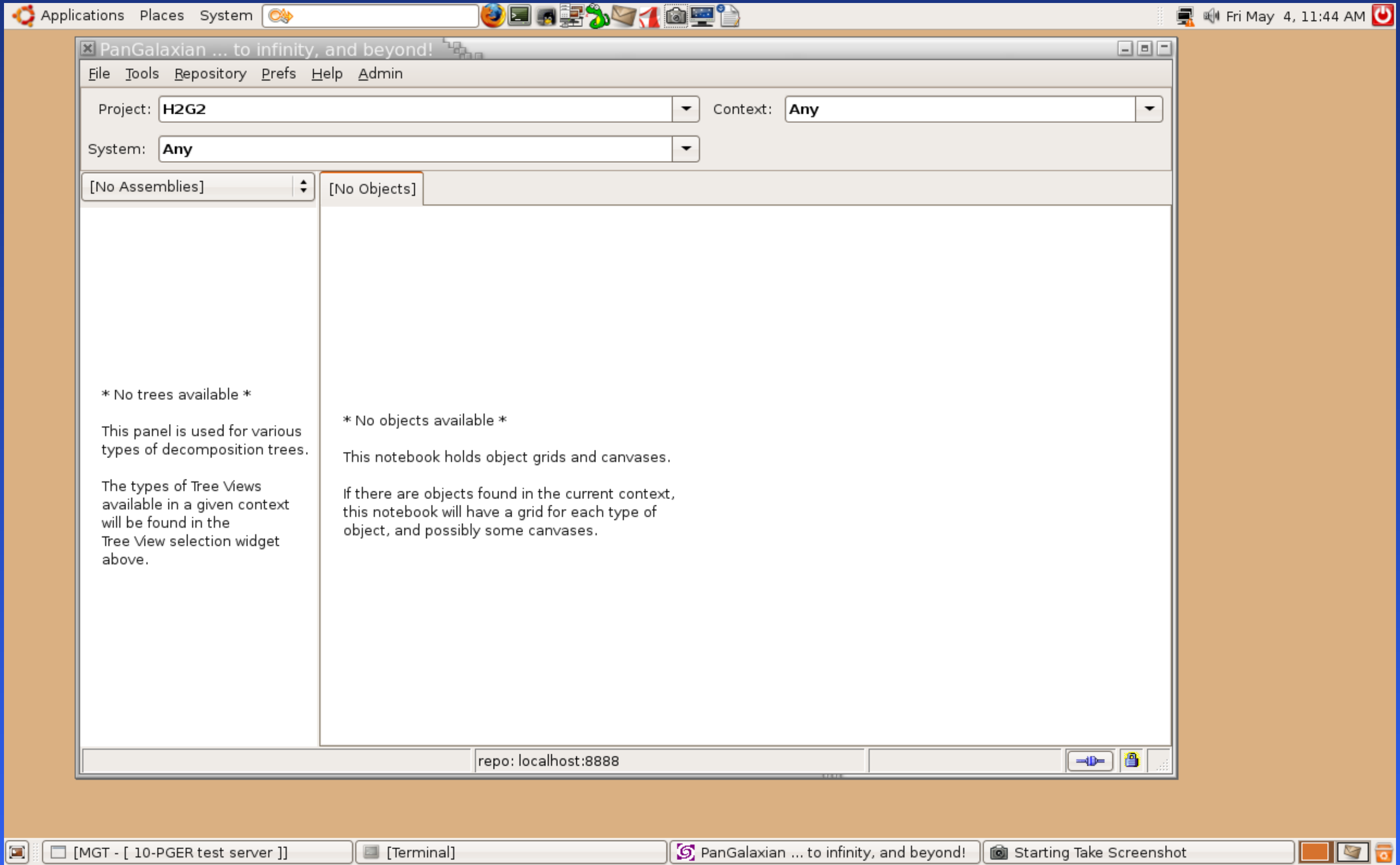
* **Structured Product Documents:** documents of which some portion is linked to (and should be validated against) product data. Examples: Requirements, ICD, Drawings, ECR, ECO, Specifications, Alerts, Analysis Reports, Technical Papers.

PGEF Demo (1)

PanGalaxian's main window, showing a project with no objects.



Project: H2G2

Context: Any

System: Any

* No trees available *

This panel is used for various types of decomposition trees.

The types of Tree Views available in a given context will be found in the Tree View selection widget above.

* No objects available *

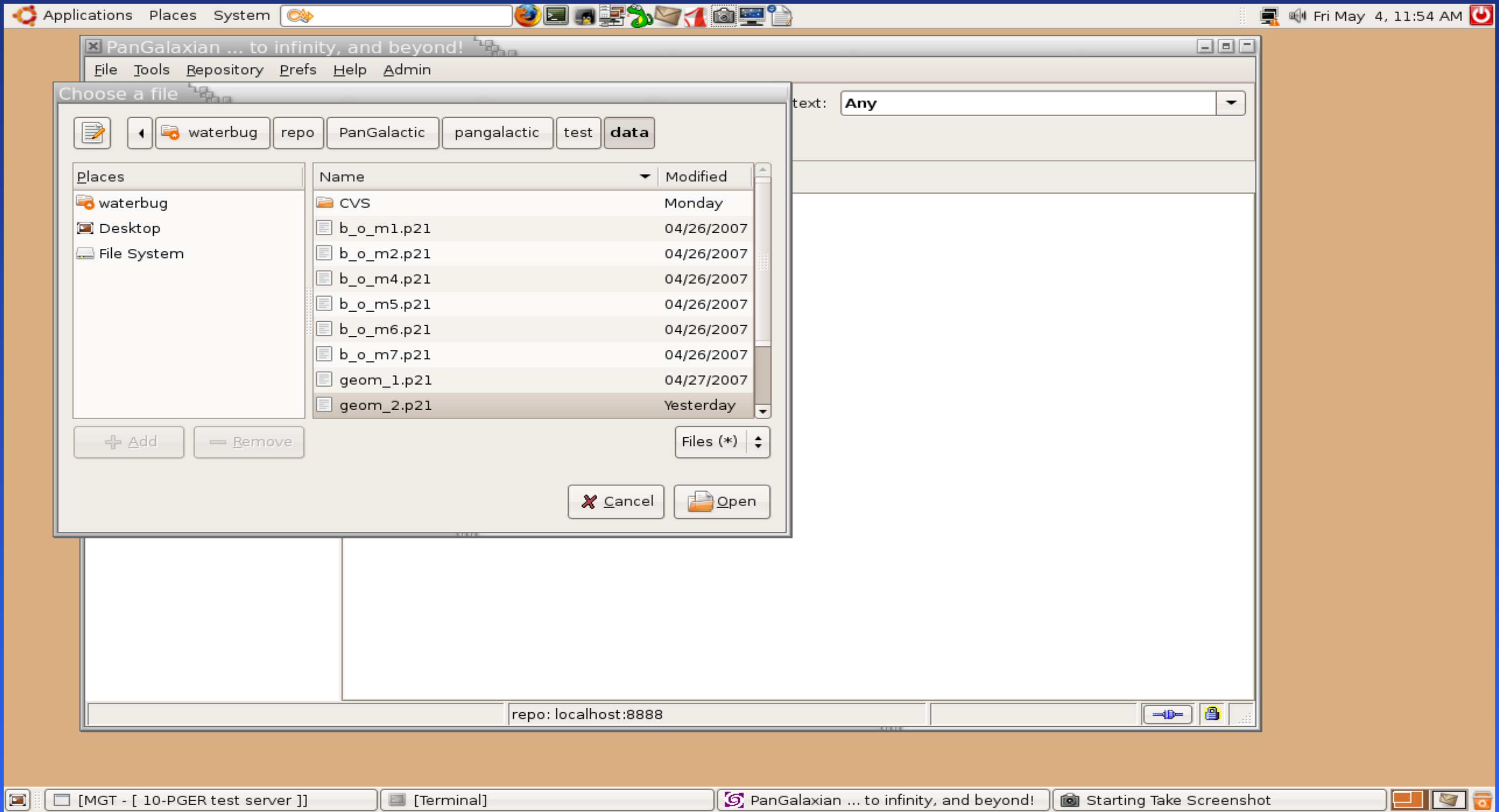
This notebook holds object grids and canvases.

If there are objects found in the current context, this notebook will have a grid for each type of object, and possibly some canvases.

repo: localhost:8888

PGEF Demo (2)

- Menu item “File / Import STEP Data” opens a file selection dialog ...



PanGalaxian ... to infinity, and beyond!

Choose a file

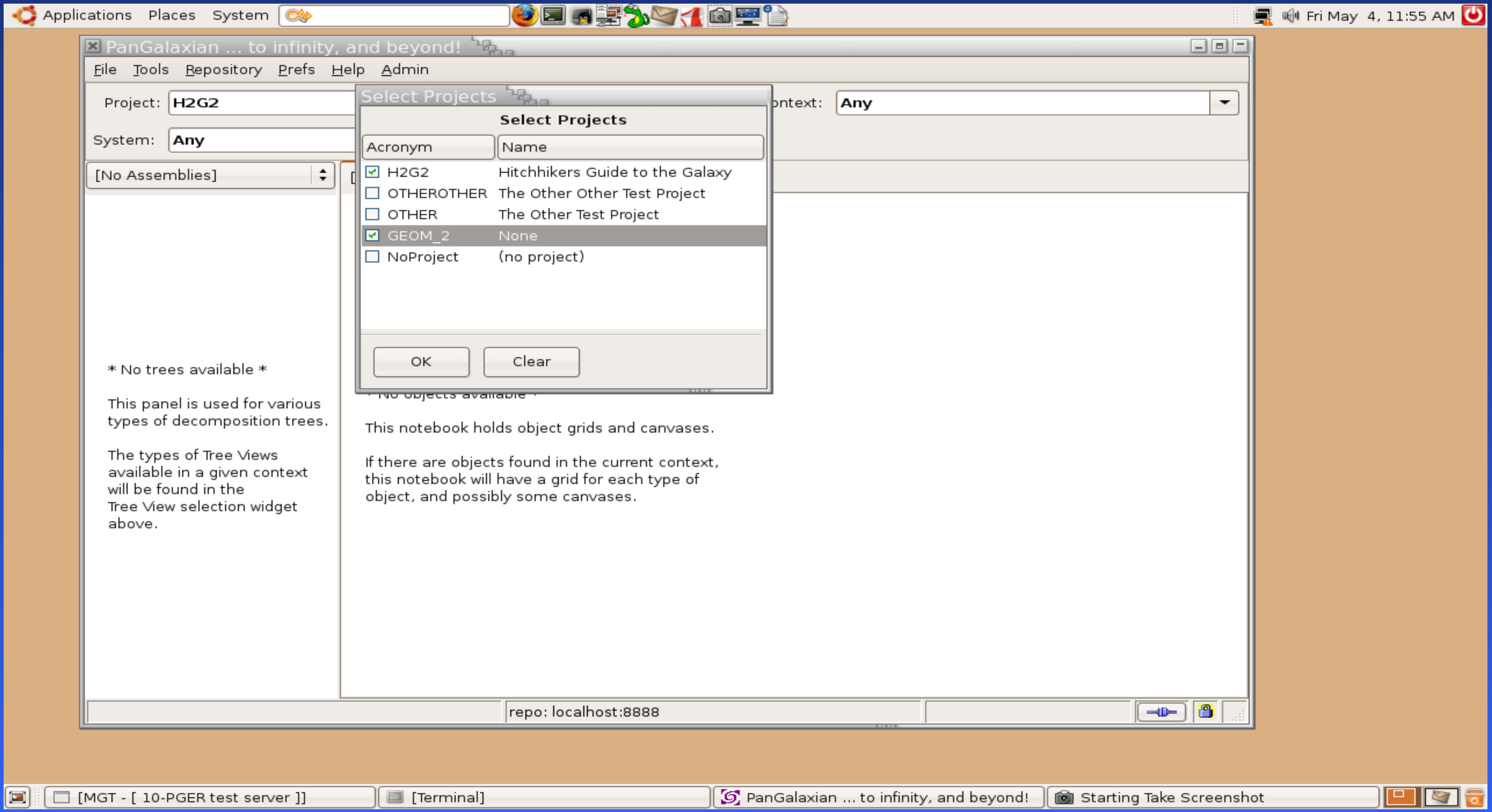
Name	Modified
CVS	Monday
b_o_m1.p21	04/26/2007
b_o_m2.p21	04/26/2007
b_o_m4.p21	04/26/2007
b_o_m5.p21	04/26/2007
b_o_m6.p21	04/26/2007
b_o_m7.p21	04/26/2007
geom_1.p21	04/27/2007
geom_2.p21	Yesterday

text: Any

repo: localhost:8888

PGEF Demo (3)

- Importing the STEP file creates a project that has the same name as the file (this was done for the demo -- an “Import Wizard” is being developed that will have options ...)



Applications Places System
Fri May 4, 11:55 AM
PanGalaxian ... to infinity, and beyond!
File Tools Repository Prefs Help Admin
Select Projects
OK
Clear
[MGT - [10-PGER test server]]
[Terminal]
PanGalaxian ... to infinity, and beyond!
Starting Take Screenshot

Project: H2G2

System: Any

[No Assemblies]

ontext: Any

Select Projects

Acronym	Name
☑ H2G2	Hitchhikers Guide to the Galaxy
□ OTHEROTHER	The Other Other Test Project
□ OTHER	The Other Test Project
☑ GEOM_2	None
□ NoProject	(no project)

* No trees available *

This panel is used for various types of decomposition trees.

The types of Tree Views available in a given context will be found in the Tree View selection widget above.

* No objects available *

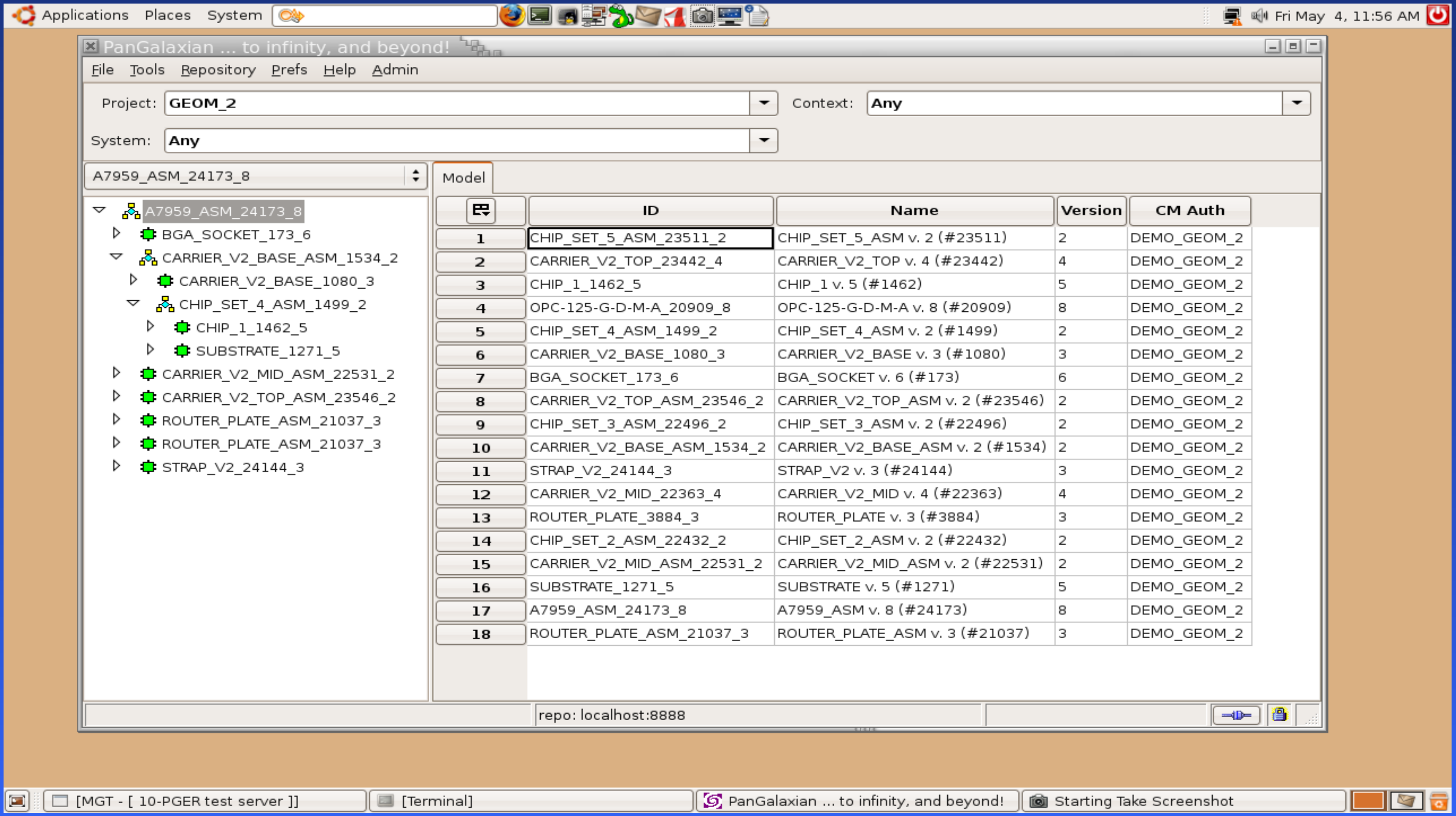
This notebook holds object grids and canvases.

If there are objects found in the current context, this notebook will have a grid for each type of object, and possibly some canvases.

repo: localhost:8888

PGEF Demo (4)

- Selecting the STEP file's project (GEOM_2) displays its assembly structure (the tree on the left) and its components, with their names and version info (the table on the right) ...



Project: GEOM_2

Context: Any

System: Any

A7959_ASM_24173_8

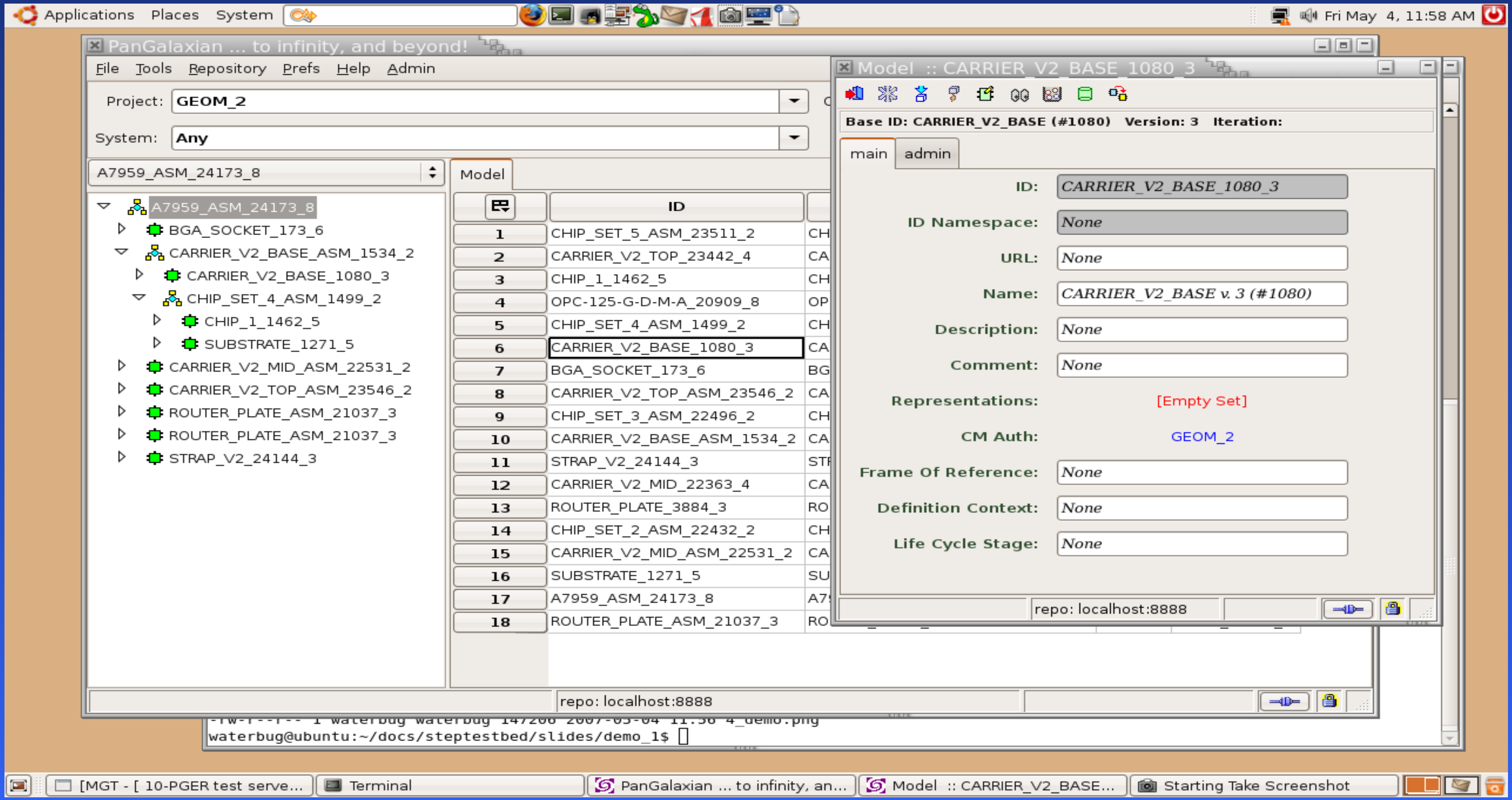
- A7959_ASM_24173_8
  - BGA_SOCKET_173_6
  - CARRIER_V2_BASE_ASM_1534_2
    - CARRIER_V2_BASE_1080_3
    - CHIP_SET_4_ASM_1499_2
      - CHIP_1_1462_5
      - SUBSTRATE_1271_5
  - CARRIER_V2_MID_ASM_22531_2
  - CARRIER_V2_TOP_ASM_23546_2
  - ROUTER_PLATE_ASM_21037_3
  - ROUTER_PLATE_ASM_21037_3
  - STRAP_V2_24144_3

	ID	Name	Version	CM Auth
1	CHIP_SET_5_ASM_23511_2	CHIP_SET_5_ASM v. 2 (#23511)	2	DEMO_GEOM_2
2	CARRIER_V2_TOP_23442_4	CARRIER_V2_TOP v. 4 (#23442)	4	DEMO_GEOM_2
3	CHIP_1_1462_5	CHIP_1 v. 5 (#1462)	5	DEMO_GEOM_2
4	OPC-125-G-D-M-A_20909_8	OPC-125-G-D-M-A v. 8 (#20909)	8	DEMO_GEOM_2
5	CHIP_SET_4_ASM_1499_2	CHIP_SET_4_ASM v. 2 (#1499)	2	DEMO_GEOM_2
6	CARRIER_V2_BASE_1080_3	CARRIER_V2_BASE v. 3 (#1080)	3	DEMO_GEOM_2
7	BGA_SOCKET_173_6	BGA_SOCKET v. 6 (#173)	6	DEMO_GEOM_2
8	CARRIER_V2_TOP_ASM_23546_2	CARRIER_V2_TOP_ASM v. 2 (#23546)	2	DEMO_GEOM_2
9	CHIP_SET_3_ASM_22496_2	CHIP_SET_3_ASM v. 2 (#22496)	2	DEMO_GEOM_2
10	CARRIER_V2_BASE_ASM_1534_2	CARRIER_V2_BASE_ASM v. 2 (#1534)	2	DEMO_GEOM_2
11	STRAP_V2_24144_3	STRAP_V2 v. 3 (#24144)	3	DEMO_GEOM_2
12	CARRIER_V2_MID_22363_4	CARRIER_V2_MID v. 4 (#22363)	4	DEMO_GEOM_2
13	ROUTER_PLATE_3884_3	ROUTER_PLATE v. 3 (#3884)	3	DEMO_GEOM_2
14	CHIP_SET_2_ASM_22432_2	CHIP_SET_2_ASM v. 2 (#22432)	2	DEMO_GEOM_2
15	CARRIER_V2_MID_ASM_22531_2	CARRIER_V2_MID_ASM v. 2 (#22531)	2	DEMO_GEOM_2
16	SUBSTRATE_1271_5	SUBSTRATE v. 5 (#1271)	5	DEMO_GEOM_2
17	A7959_ASM_24173_8	A7959_ASM v. 8 (#24173)	8	DEMO_GEOM_2
18	ROUTER_PLATE_ASM_21037_3	ROUTER_PLATE_ASM v. 3 (#21037)	3	DEMO_GEOM_2

repo: localhost:8888

PGEF Demo (5)

- Double-clicking an item in the grid (in this case, a “Model” object) brings up an object widget that displays the object's type (the frame title), ID, version information, and properties ...


Applications
Places
System
Fri May 4, 11:58 AM
PanGalaxian ... to infinity, and beyond!
File
Tools
Repository
Prefs
Help
Admin
Model
main
admin
[MGT - [10-PGER test serve...
Terminal
PanGalaxian ... to infinity, an...
Model :: CARRIER_V2_BASE...
Starting Take Screenshot

Project: GEOM_2

System: Any

A7959_ASM_24173_8

- A7959_ASM_24173_8
  - BGA_SOCKET_173_6
  - CARRIER_V2_BASE_ASM_1534_2
    - CARRIER_V2_BASE_1080_3
    - CHIP_SET_4_ASM_1499_2
      - CHIP_1_1462_5
      - SUBSTRATE_1271_5
  - CARRIER_V2_MID_ASM_22531_2
  - CARRIER_V2_TOP_ASM_23546_2
  - ROUTER_PLATE_ASM_21037_3
  - ROUTER_PLATE_ASM_21037_3
  - STRAP_V2_24144_3

	ID	
1	CHIP_SET_5_ASM_23511_2	CH
2	CARRIER_V2_TOP_23442_4	CA
3	CHIP_1_1462_5	CH
4	OPC-125-G-D-M-A_20909_8	OP
5	CHIP_SET_4_ASM_1499_2	CH
6	CARRIER_V2_BASE_1080_3	CA
7	BGA_SOCKET_173_6	BG
8	CARRIER_V2_TOP_ASM_23546_2	CA
9	CHIP_SET_3_ASM_22496_2	CH
10	CARRIER_V2_BASE_ASM_1534_2	CA
11	STRAP_V2_24144_3	STI
12	CARRIER_V2_MID_22363_4	CA
13	ROUTER_PLATE_3884_3	RO
14	CHIP_SET_2_ASM_22432_2	CH
15	CARRIER_V2_MID_ASM_22531_2	CA
16	SUBSTRATE_1271_5	SU
17	A7959_ASM_24173_8	A7
18	ROUTER_PLATE_ASM_21037_3	RO

repo: localhost:8888

Model :: CARRIER_V2_BASE_1080_3

Base ID: CARRIER_V2_BASE (#1080) Version: 3 Iteration:

ID: *CARRIER_V2_BASE_1080_3*

ID Namespace: *None*

URL: *None*

Name: *CARRIER_V2_BASE v. 3 (#1080)*

Description: *None*

Comment: *None*

Representations: [Empty Set]

CM Auth: GEOM_2

Frame Of Reference: *None*

Definition Context: *None*

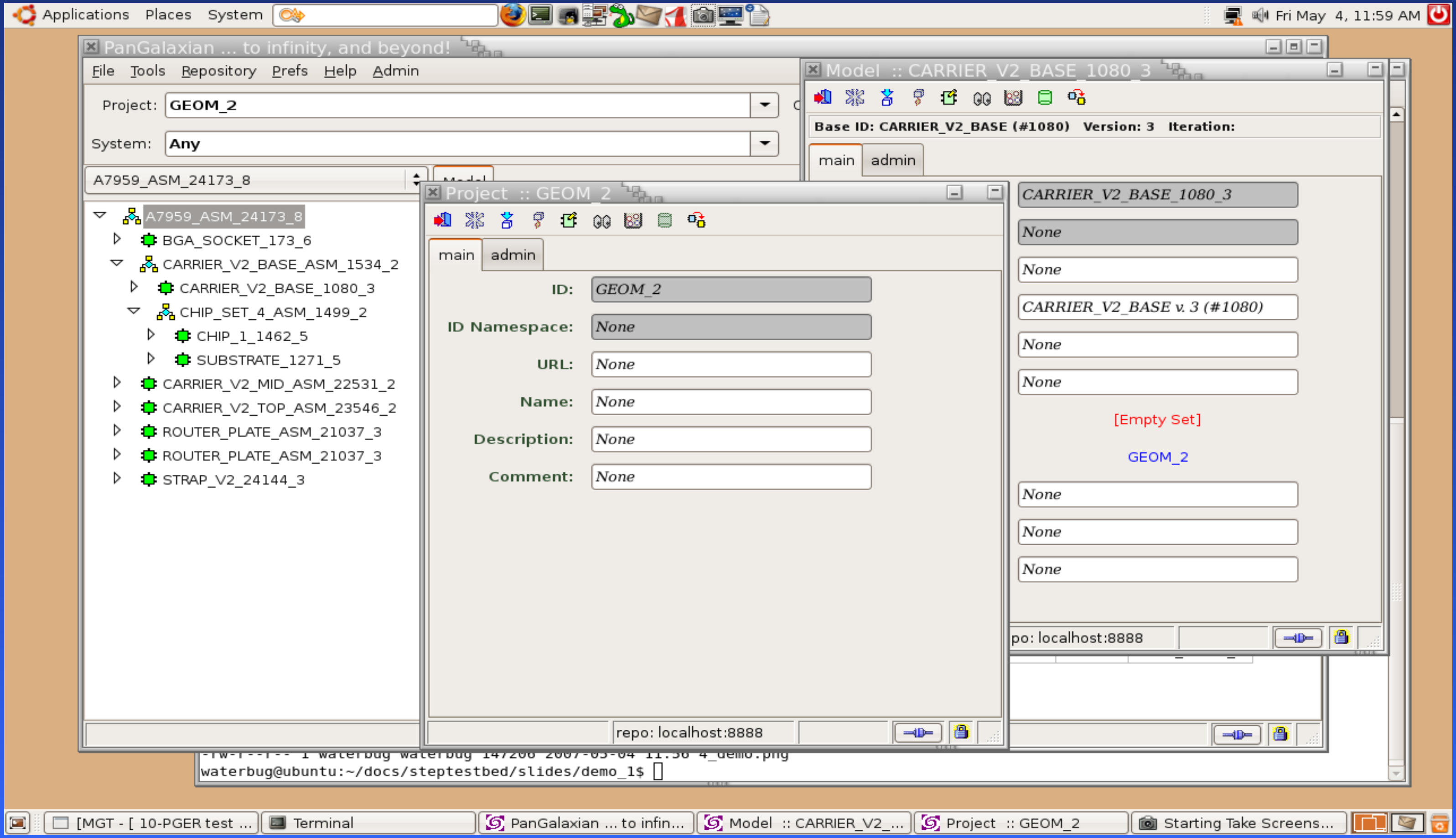
Life Cycle Stage: *None*

repo: localhost:8888

```
-rw-r--r-- 1 waterbug waterbug 147206 2007-05-04 11:58 4_demo.png
waterbug@ubuntu:~/docs/steptestbed/slides/demo_1$ 
```

PGEF Demo (6)

- If an object has a property that is another object – such as the “CM Auth” property of the object on the previous slide – clicking on its value brings up that object (a Project, GEOM_2) ...



Applications Places System
Fri May 4, 11:59 AM
PanGalaxian ... to infinity, and beyond!
File Tools Repository Prefs Help Admin
Model :: CARRIER_V2_BASE_1080_3
Project :: GEOM_2
main admin
[MGT - [10-PGER test ...
Terminal
PanGalaxian ... to infin...
Model :: CARRIER_V2_...
Project :: GEOM_2
Starting Take Screens...

Project: GEOM_2

System: Any

A7959_ASM_24173_8

- A7959_ASM_24173_8
  - BGA_SOCKET_173_6
  - CARRIER_V2_BASE_ASM_1534_2
    - CARRIER_V2_BASE_1080_3
    - CHIP_SET_4_ASM_1499_2
      - CHIP_1_1462_5
      - SUBSTRATE_1271_5
  - CARRIER_V2_MID_ASM_22531_2
  - CARRIER_V2_TOP_ASM_23546_2
  - ROUTER_PLATE_ASM_21037_3
  - ROUTER_PLATE_ASM_21037_3
  - STRAP_V2_24144_3

Project :: GEOM_2

ID: GEOM_2
ID Namespace: None
URL: None
Name: None
Description: None
Comment: None

repo: localhost:8888

Model :: CARRIER_V2_BASE_1080_3

Base ID: CARRIER_V2_BASE (#1080) Version: 3 Iteration:

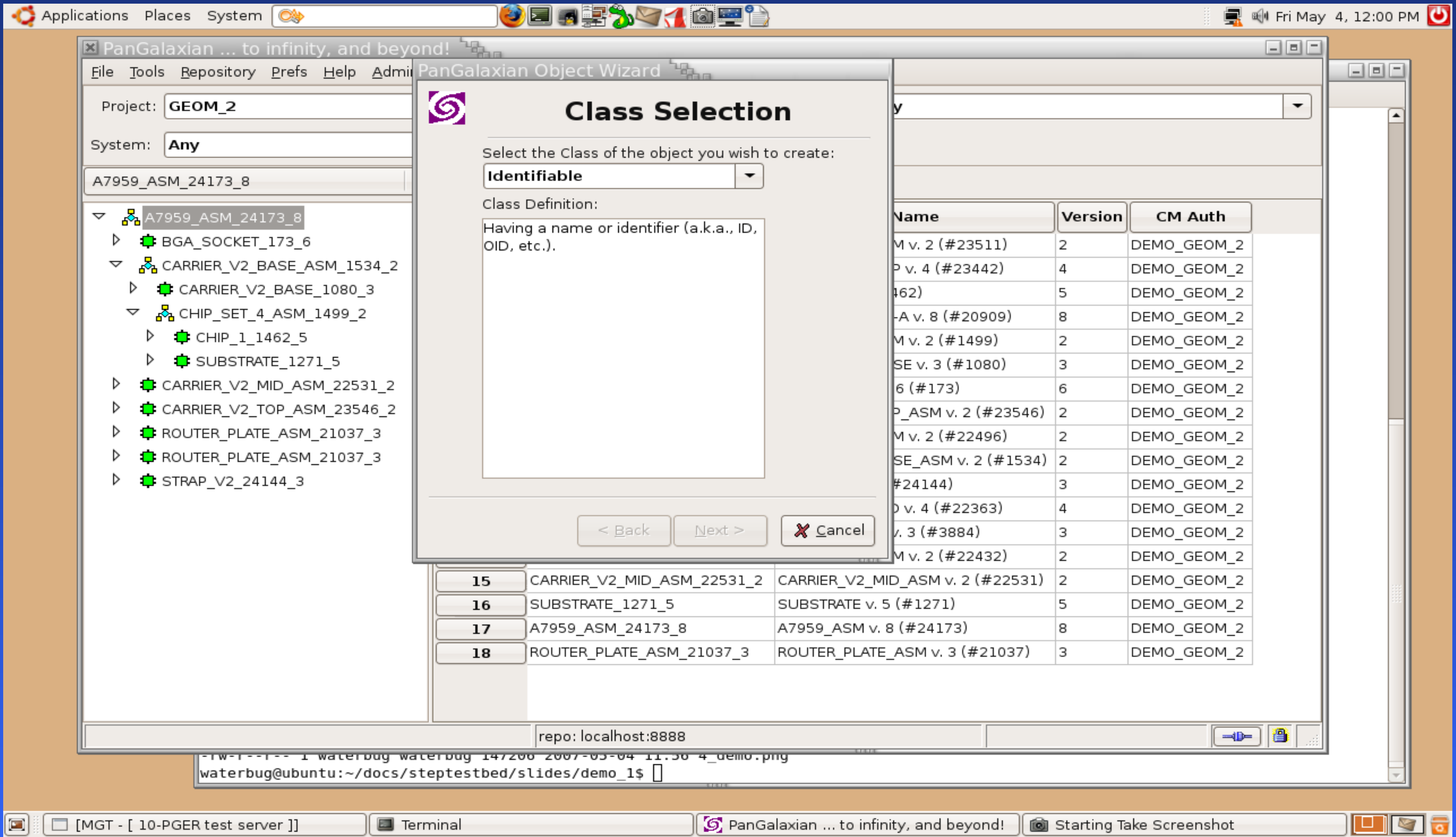
CARRIER_V2_BASE_1080_3
None
None
CARRIER_V2_BASE v. 3 (#1080)
None
None
[Empty Set]
GEOM_2
None
None
None

po: localhost:8888

```
-rw-r--r-- 1 waterbug waterbug 147206 2007-05-04 11:58 4_demo.png
waterbug@ubuntu:~/docs/steptestbed/slides/demo_1$
```

PGEF Demo (7)

- Object creation in PanGalaxian:
  Menu item “File / New Object” brings up the Object Wizard. First step: select a Class ..



Applications   Places   System
Fri May 4, 12:00 PM
PanGalaxian ... to infinity, and beyond!
File   Tools   Repository   Prefs   Help   Admi

Project: GEOM_2

System: Any

A7959_ASM_24173_8

- A7959_ASM_24173_8
  - BGA_SOCKET_173_6
  - CARRIER_V2_BASE_ASM_1534_2
    - CARRIER_V2_BASE_1080_3
    - CHIP_SET_4_ASM_1499_2
      - CHIP_1_1462_5
      - SUBSTRATE_1271_5
  - CARRIER_V2_MID_ASM_22531_2
  - CARRIER_V2_TOP_ASM_23546_2
  - ROUTER_PLATE_ASM_21037_3
  - ROUTER_PLATE_ASM_21037_3
  - STRAP_V2_24144_3

PanGalaxian Object Wizard

Class Selection

Select the Class of the object you wish to create:

Identifiable

Class Definition:

Having a name or identifier (a.k.a., ID, OID, etc.).

		Name	Version	CM Auth
		M v. 2 (#23511)	2	DEMO_GEOM_2
		P v. 4 (#23442)	4	DEMO_GEOM_2
		462)	5	DEMO_GEOM_2
		-A v. 8 (#20909)	8	DEMO_GEOM_2
		M v. 2 (#1499)	2	DEMO_GEOM_2
		SE v. 3 (#1080)	3	DEMO_GEOM_2
		6 (#173)	6	DEMO_GEOM_2
		P_ASM v. 2 (#23546)	2	DEMO_GEOM_2
		M v. 2 (#22496)	2	DEMO_GEOM_2
		SE_ASM v. 2 (#1534)	2	DEMO_GEOM_2
		#24144)	3	DEMO_GEOM_2
		D v. 4 (#22363)	4	DEMO_GEOM_2
		/. 3 (#3884)	3	DEMO_GEOM_2
		M v. 2 (#22432)	2	DEMO_GEOM_2
15	CARRIER_V2_MID_ASM_22531_2	CARRIER_V2_MID_ASM v. 2 (#22531)	2	DEMO_GEOM_2
16	SUBSTRATE_1271_5	SUBSTRATE v. 5 (#1271)	5	DEMO_GEOM_2
17	A7959_ASM_24173_8	A7959_ASM v. 8 (#24173)	8	DEMO_GEOM_2
18	ROUTER_PLATE_ASM_21037_3	ROUTER_PLATE_ASM v. 3 (#21037)	3	DEMO_GEOM_2

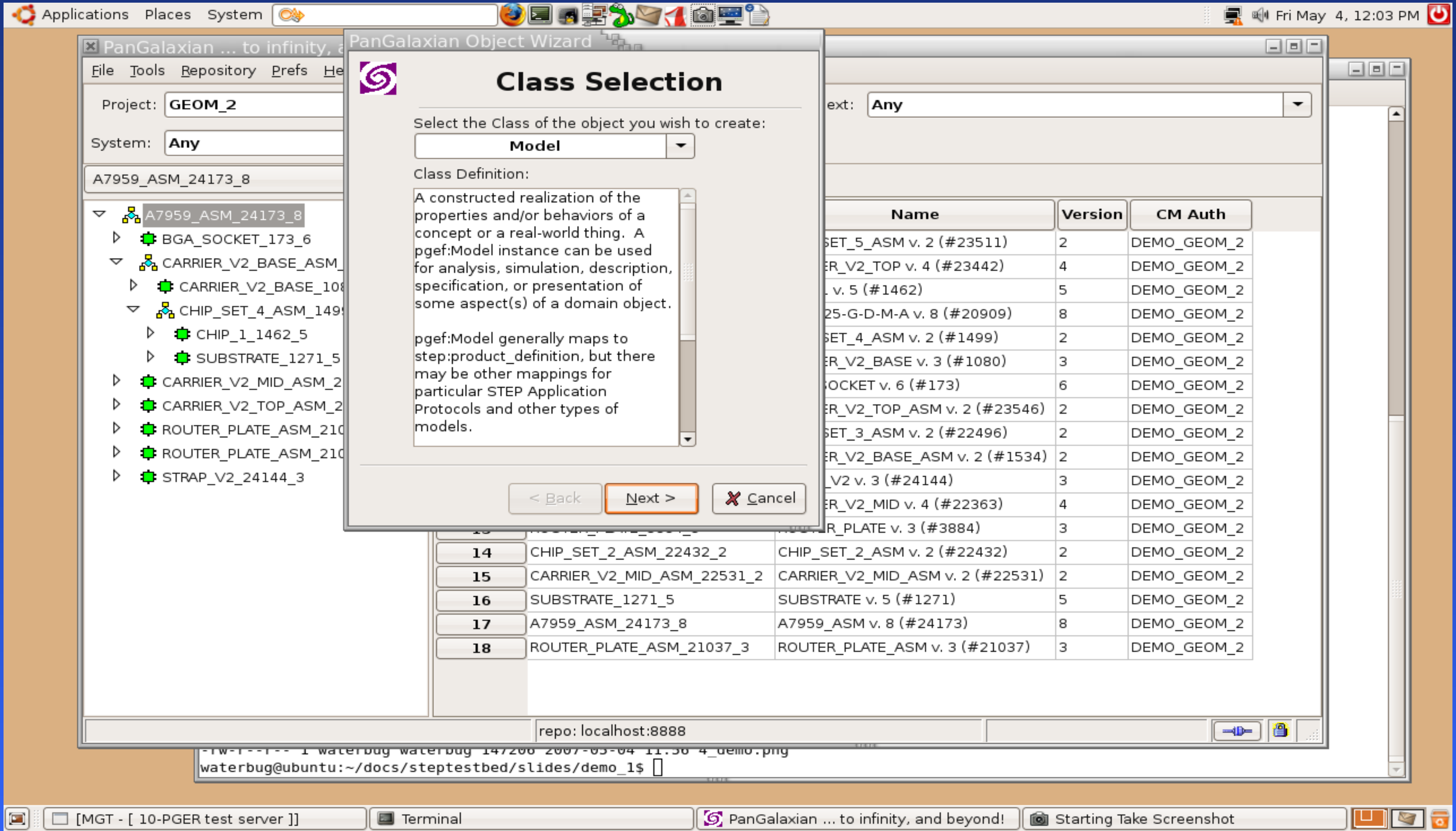
repo: localhost:8888

```
-rw-r--r-- 1 waterbug waterbug 147208 2007-05-04 11:58 4_demo.png
waterbug@ubuntu:~/docs/steptestbed/slides/demo_1$ 
```

[MGT - [10-PGER test server]]
Terminal
PanGalaxian ... to infinity, and beyond!
Starting Take Screenshot

PGEF Demo (8)

- When a Class is selected, its definition is displayed, and the “Next” button is enabled ...



Applications Places System
Fri May 4, 12:03 PM
PanGalaxian ... to infinity, a
File Tools Repository Prefs He
PanGalaxian Object Wizard
< Back
Next >
Cancel
[MGT - [10-PGER test server]]
Terminal
PanGalaxian ... to infinity, and beyond!
Starting Take Screenshot

Project: GEOM_2

System: Any

ext: Any

A7959_ASM_24173_8

- A7959_ASM_24173_8
  - BGA_SOCKET_173_6
  - CARRIER_V2_BASE_ASM_
    - CARRIER_V2_BASE_108
    - CHIP_SET_4_ASM_149
      - CHIP_1_1462_5
      - SUBSTRATE_1271_5
  - CARRIER_V2_MID_ASM_2
  - CARRIER_V2_TOP_ASM_2
  - ROUTER_PLATE_ASM_210
  - ROUTER_PLATE_ASM_210
  - STRAP_V2_24144_3

Class Selection

Select the Class of the object you wish to create: Model

Class Definition:

A constructed realization of the properties and/or behaviors of a concept or a real-world thing. A pgef:Model instance can be used for analysis, simulation, description, specification, or presentation of some aspect(s) of a domain object.

pgef:Model generally maps to step:product_definition, but there may be other mappings for particular STEP Application Protocols and other types of models.

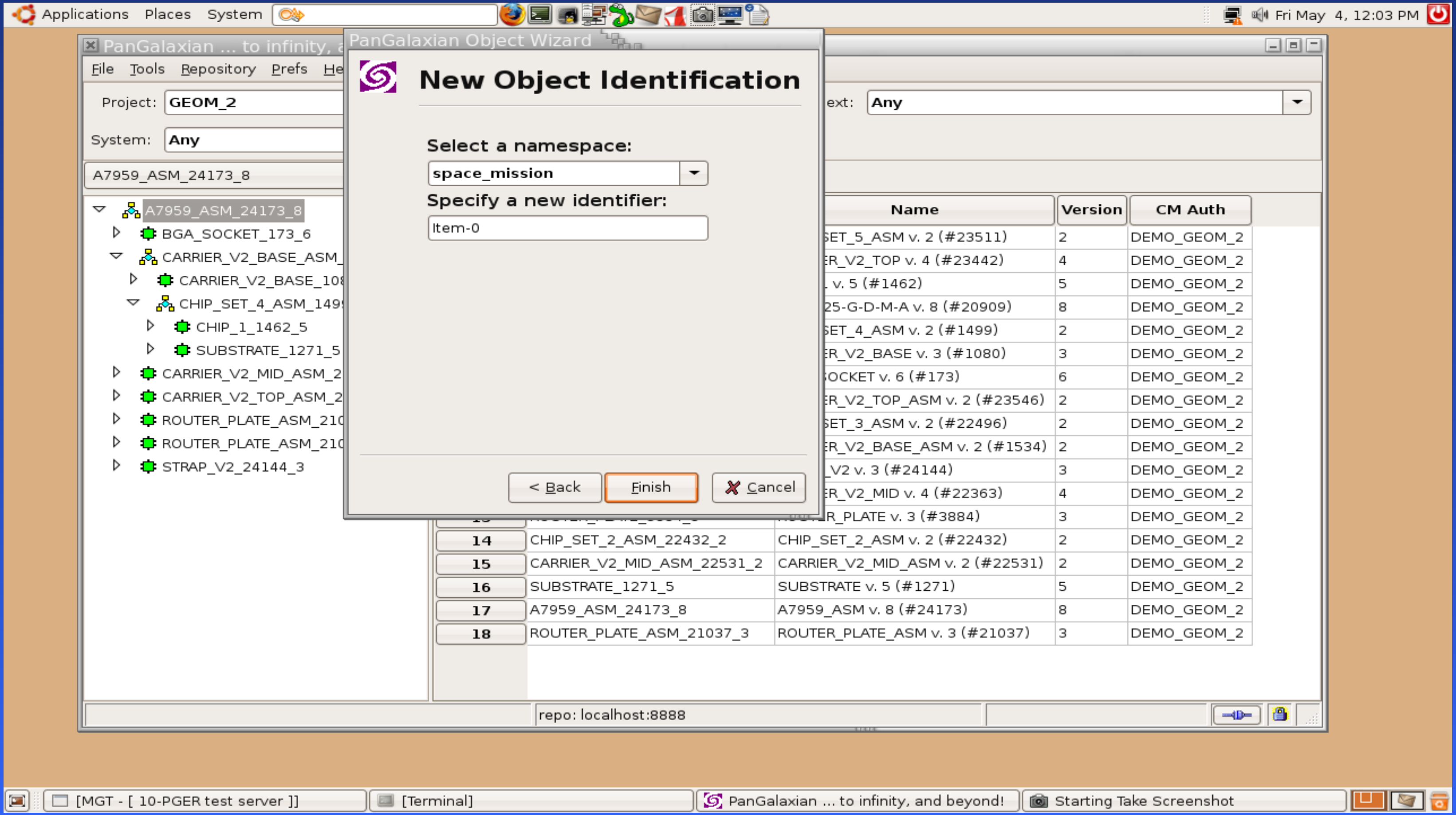
		Name	Version	CM Auth
		ET_5_ASM v. 2 (#23511)	2	DEMO_GEOM_2
		R_V2_TOP v. 4 (#23442)	4	DEMO_GEOM_2
		v. 5 (#1462)	5	DEMO_GEOM_2
		25-G-D-M-A v. 8 (#20909)	8	DEMO_GEOM_2
		ET_4_ASM v. 2 (#1499)	2	DEMO_GEOM_2
		R_V2_BASE v. 3 (#1080)	3	DEMO_GEOM_2
		OCKET v. 6 (#173)	6	DEMO_GEOM_2
		R_V2_TOP_ASM v. 2 (#23546)	2	DEMO_GEOM_2
		ET_3_ASM v. 2 (#22496)	2	DEMO_GEOM_2
		R_V2_BASE_ASM v. 2 (#1534)	2	DEMO_GEOM_2
		V2 v. 3 (#24144)	3	DEMO_GEOM_2
		R_V2_MID v. 4 (#22363)	4	DEMO_GEOM_2
		R_PLATE v. 3 (#3884)	3	DEMO_GEOM_2
14	CHIP_SET_2_ASM_22432_2	CHIP_SET_2_ASM v. 2 (#22432)	2	DEMO_GEOM_2
15	CARRIER_V2_MID_ASM_22531_2	CARRIER_V2_MID_ASM v. 2 (#22531)	2	DEMO_GEOM_2
16	SUBSTRATE_1271_5	SUBSTRATE v. 5 (#1271)	5	DEMO_GEOM_2
17	A7959_ASM_24173_8	A7959_ASM v. 8 (#24173)	8	DEMO_GEOM_2
18	ROUTER_PLATE_ASM_21037_3	ROUTER_PLATE_ASM v. 3 (#21037)	3	DEMO_GEOM_2

repo: localhost:8888

```
-rw-r--r--  1 waterbug waterbug 147206 2007-05-04 11:58 4_demo.png
waterbug@ubuntu:~/docs/steptestbed/slides/demo_1$
```

PGEF Demo (9)

- Next, select a namespace (within which the new object's ID will be unique) and an identifier for the new object (the wizard will check for uniqueness within the namespace) ...



Project: GEOM_2

System: Any

ext: Any

New Object Identification

Select a namespace: space_mission

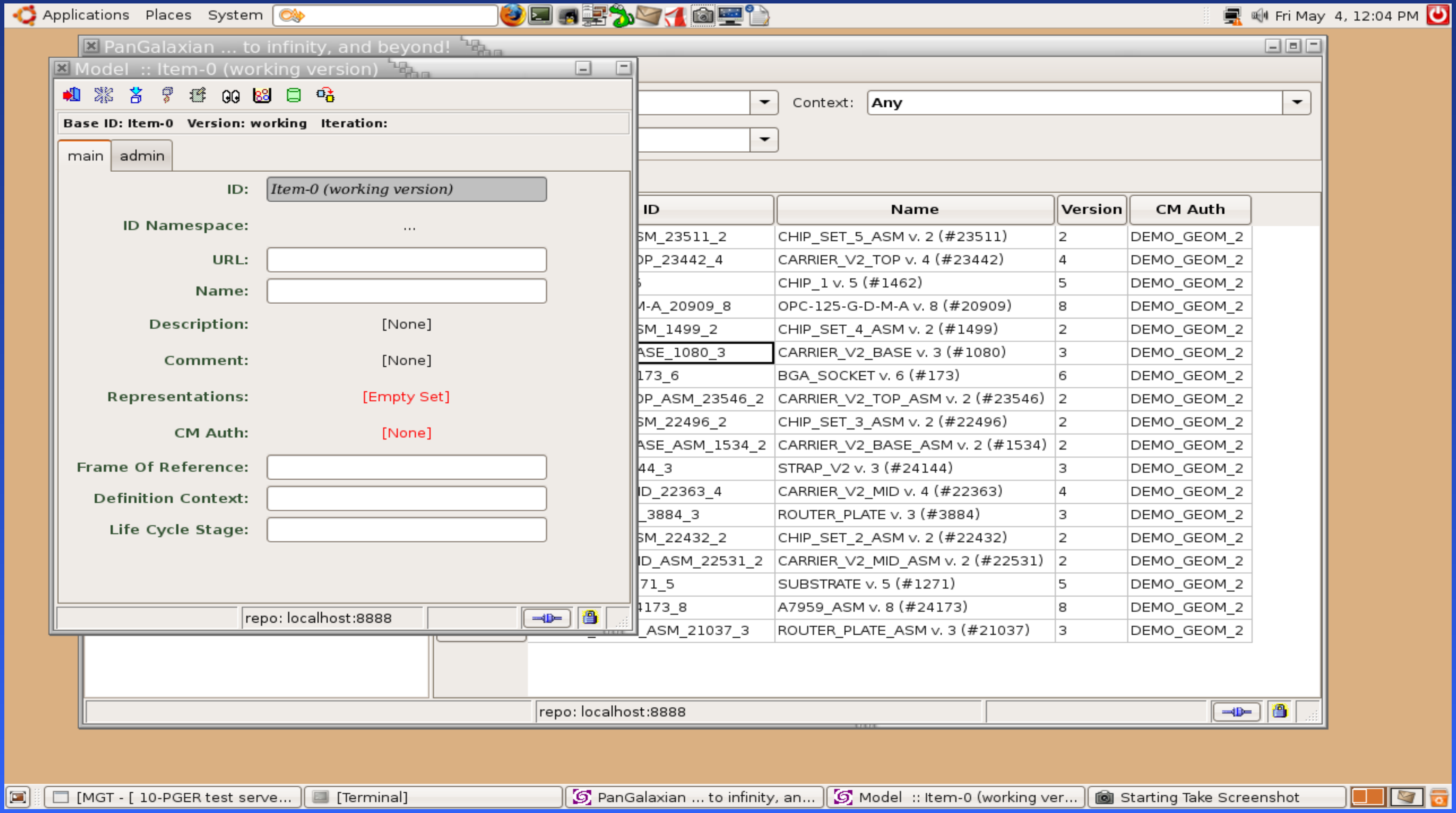
Specify a new identifier: Item-0

		Name	Version	CM Auth
		SET_5_ASM v. 2 (#23511)	2	DEMO_GEOM_2
		ER_V2_TOP v. 4 (#23442)	4	DEMO_GEOM_2
		v. 5 (#1462)	5	DEMO_GEOM_2
		25-G-D-M-A v. 8 (#20909)	8	DEMO_GEOM_2
		SET_4_ASM v. 2 (#1499)	2	DEMO_GEOM_2
		ER_V2_BASE v. 3 (#1080)	3	DEMO_GEOM_2
		OCKET v. 6 (#173)	6	DEMO_GEOM_2
		ER_V2_TOP_ASM v. 2 (#23546)	2	DEMO_GEOM_2
		SET_3_ASM v. 2 (#22496)	2	DEMO_GEOM_2
		ER_V2_BASE_ASM v. 2 (#1534)	2	DEMO_GEOM_2
		V2 v. 3 (#24144)	3	DEMO_GEOM_2
		ER_V2_MID v. 4 (#22363)	4	DEMO_GEOM_2
		R_PLATE v. 3 (#3884)	3	DEMO_GEOM_2
14	CHIP_SET_2_ASM_22432_2	CHIP_SET_2_ASM v. 2 (#22432)	2	DEMO_GEOM_2
15	CARRIER_V2_MID_ASM_22531_2	CARRIER_V2_MID_ASM v. 2 (#22531)	2	DEMO_GEOM_2
16	SUBSTRATE_1271_5	SUBSTRATE v. 5 (#1271)	5	DEMO_GEOM_2
17	A7959_ASM_24173_8	A7959_ASM v. 8 (#24173)	8	DEMO_GEOM_2
18	ROUTER_PLATE_ASM_21037_3	ROUTER_PLATE_ASM v. 3 (#21037)	3	DEMO_GEOM_2

repo: localhost:8888

PGEF Demo (10)

- The wizard ends, bringing up the new object ready for editing, saving, and committing to a repository ...



Applications
Places
System
Fri May 4, 12:04 PM
PanGalaxian ... to infinity, and beyond!
Model :: Item-0 (working version)
main
admin
Context:
[MGT - [10-PGER test serve...
[Terminal]
PanGalaxian ... to infinity, an...
Model :: Item-0 (working ver...
Starting Take Screenshot

Base ID: Item-0 Version: working Iteration:

ID:	*Item-0 (working version)*
ID Namespace:	...
URL:	
Name:	
Description:	[None]
Comment:	[None]
Representations:	[Empty Set]
CM Auth:	[None]
Frame Of Reference:	
Definition Context:	
Life Cycle Stage:	

repo: localhost:8888

Context: Any

ID	Name	Version	CM Auth
SM_23511_2	CHIP_SET_5_ASM v. 2 (#23511)	2	DEMO_GEOM_2
DP_23442_4	CARRIER_V2_TOP v. 4 (#23442)	4	DEMO_GEOM_2
5	CHIP_1 v. 5 (#1462)	5	DEMO_GEOM_2
M-A_20909_8	OPC-125-G-D-M-A v. 8 (#20909)	8	DEMO_GEOM_2
SM_1499_2	CHIP_SET_4_ASM v. 2 (#1499)	2	DEMO_GEOM_2
ASE_1080_3	CARRIER_V2_BASE v. 3 (#1080)	3	DEMO_GEOM_2
173_6	BGA_SOCKET v. 6 (#173)	6	DEMO_GEOM_2
DP_ASM_23546_2	CARRIER_V2_TOP_ASM v. 2 (#23546)	2	DEMO_GEOM_2
SM_22496_2	CHIP_SET_3_ASM v. 2 (#22496)	2	DEMO_GEOM_2
ASE_ASM_1534_2	CARRIER_V2_BASE_ASM v. 2 (#1534)	2	DEMO_GEOM_2
44_3	STRAP_V2 v. 3 (#24144)	3	DEMO_GEOM_2
ID_22363_4	CARRIER_V2_MID v. 4 (#22363)	4	DEMO_GEOM_2
_3884_3	ROUTER_PLATE v. 3 (#3884)	3	DEMO_GEOM_2
SM_22432_2	CHIP_SET_2_ASM v. 2 (#22432)	2	DEMO_GEOM_2
ID_ASM_22531_2	CARRIER_V2_MID_ASM v. 2 (#22531)	2	DEMO_GEOM_2
71_5	SUBSTRATE v. 5 (#1271)	5	DEMO_GEOM_2
4173_8	A7959_ASM v. 8 (#24173)	8	DEMO_GEOM_2
_ASM_21037_3	ROUTER_PLATE_ASM v. 3 (#21037)	3	DEMO_GEOM_2

repo: localhost:8888