OpenIDM

Yesterday, Today and Tomorrow

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January 2011

Agenda

- OpenIDM Yesterday
- OpenIDM Today
- OpenIDM Tomorrow

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But before we get to that ...

What OpenIDM Should Be?

What is OpenIDM

- **Open source provisioning system**
  - Identity Lifecycle Management & Integration
  - Fully open-source system (CDDL)
  - Brand new system, modern architecture
- **Ready for commercial Operation**
  - Reliable, Maintainable, Flexible

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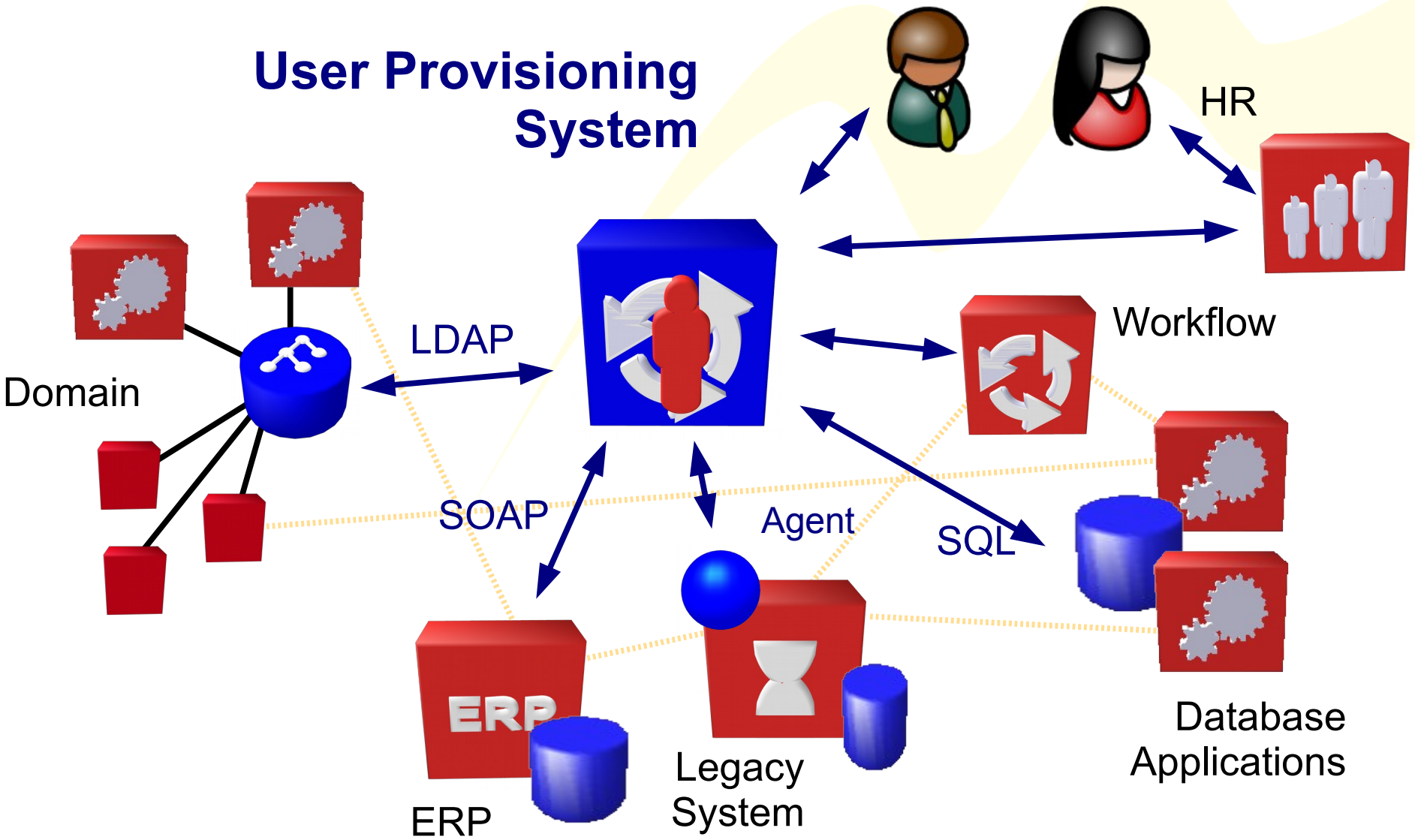
OpenIDM Goals

- ***Provisioning* system**
  - Provisioning, de-provisioning, re-provisioning
  - Data synchronization (automation)
  - Enforce access policies (e.g. RBAC)
  - Support manual activities and exceptions
- **Goal: Identity data consolidation, cleanup and maintenance**

Integration, Integration, Integration!



OpenIDM Goals

- ***Next Generation* system**
  - Component-based system (ESB, OSGi, modular)
  - High-level languages (BPEL, XPath, XSLT, ...)
  - Integration (Web Sevices)
  - … and other buzzwords ...
- **Goal: <u>Efficiently</u> extensible and customizable**

OpenIDM Goals

- ***Provisioning system construction kit***
  - LEGO-like set of components
  - Can be re-combined if needed
  - Choose components that you need
  - Replace some components with others
  - But still have a “default” structure for 80% of cases
- **Goal: Flexibility, flexibility, flexibility**

OpenIDM Goals

- ***Usable* system**
  - Development environment (Netbeans)
  - Fast development cycles (develop-test-deploy)
  - Diagnostics and debugging
  - Open and documented source
  - Open development process
- **Goal: Deploy and maintain with reasonable cost**

Basic Principles

- **Do not re-invent the wheel**
  - Use industry standards and proven mechanisms if possible
    - e.g. ESB/JBI, BPEL, XPath, JSF, …
  - But avoid over-complicating the system
    - e.g. SPML

Basic Principles

- **XML Everywhere**
  - Data in XML: strict (yet extensible) schemas
  - Interfaces in XML: WSDL
  - Schemas in XML: XSD
    - XSD Schemas for everything (including resources)
  - Efficiency: XML infoset instead of string XML
    - If needed, avoid premature optimizations

Easy Development

- **Detect bugs as early as possible**
  - XML schemas to validate data and configuration
  - Unit tests and validators
- **Architecture-driven, but still considerably agile**
  - Architecture is a guideline, not a dogma
  - Engineering feedback is essential (prototypes, PoC)
  - Customer feedback is the most precious information

OpenIDM Yesterday

or How We Have Originally Designed It

Abstract Architecture

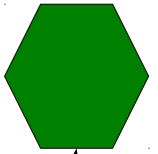
Administrators
Users

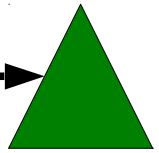
User Interface

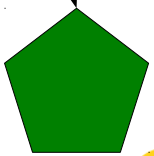
Business Logic

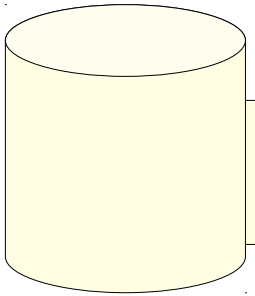
IDM Model

Resources









Repository

Provisioning

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Abstract Architecture

Administrators
Users

User Interface

Business Logic

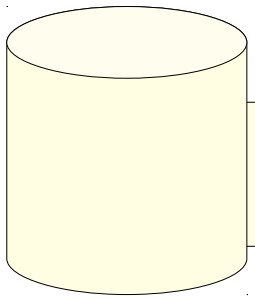
Processing the policies

IDM Model

RBAC,
ABAC,
Hybrid, ...

Resources

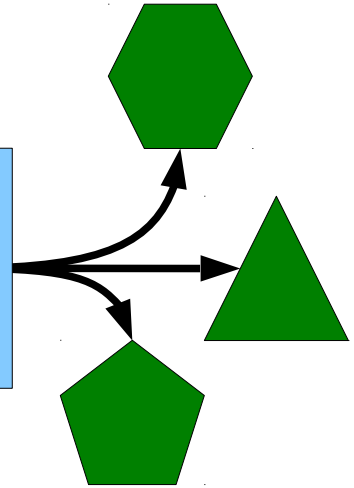
Relational Database
(or maybe LDAP later)



Repository

Provisioning

IC



Identity Connector
Framework

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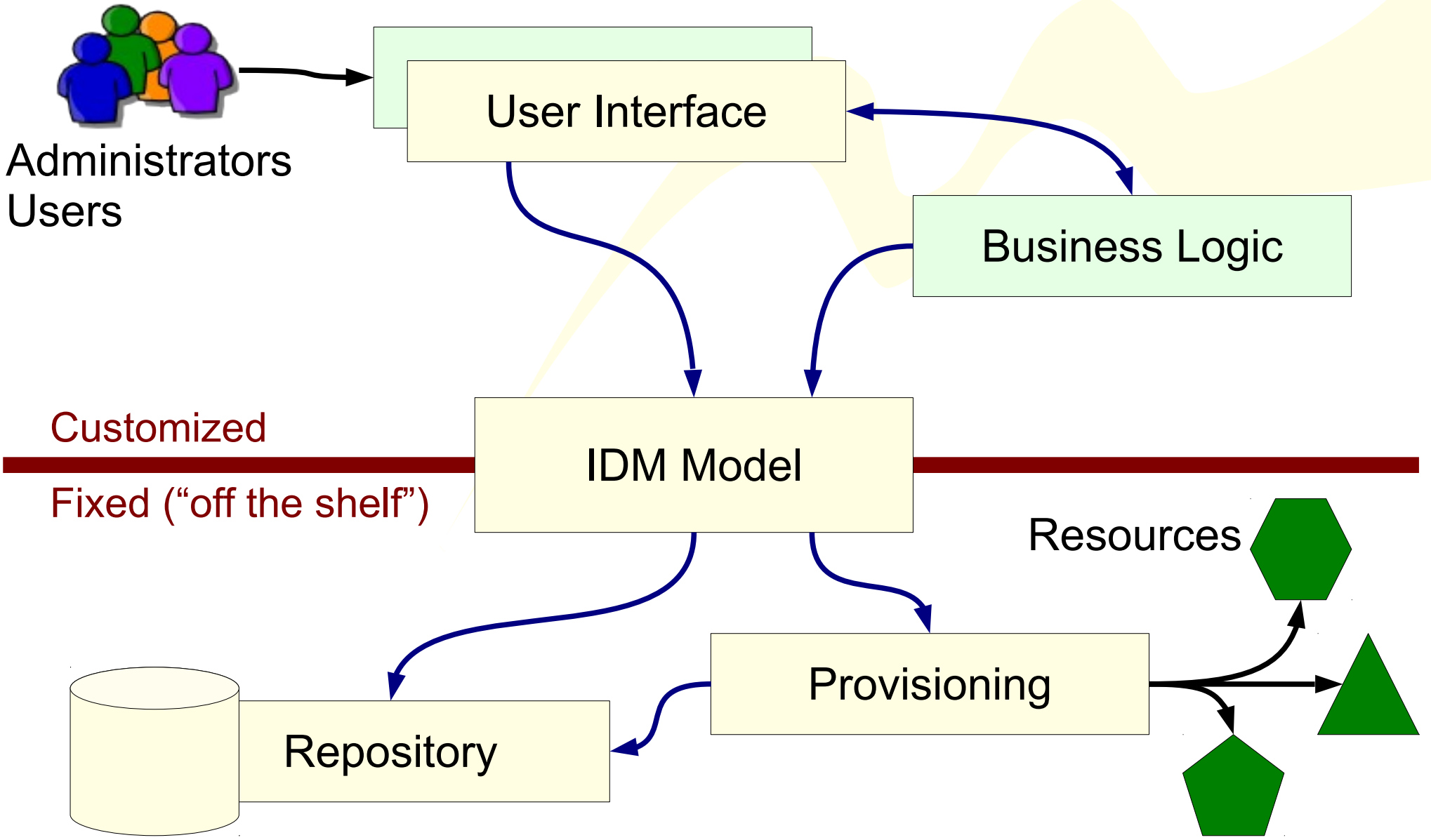
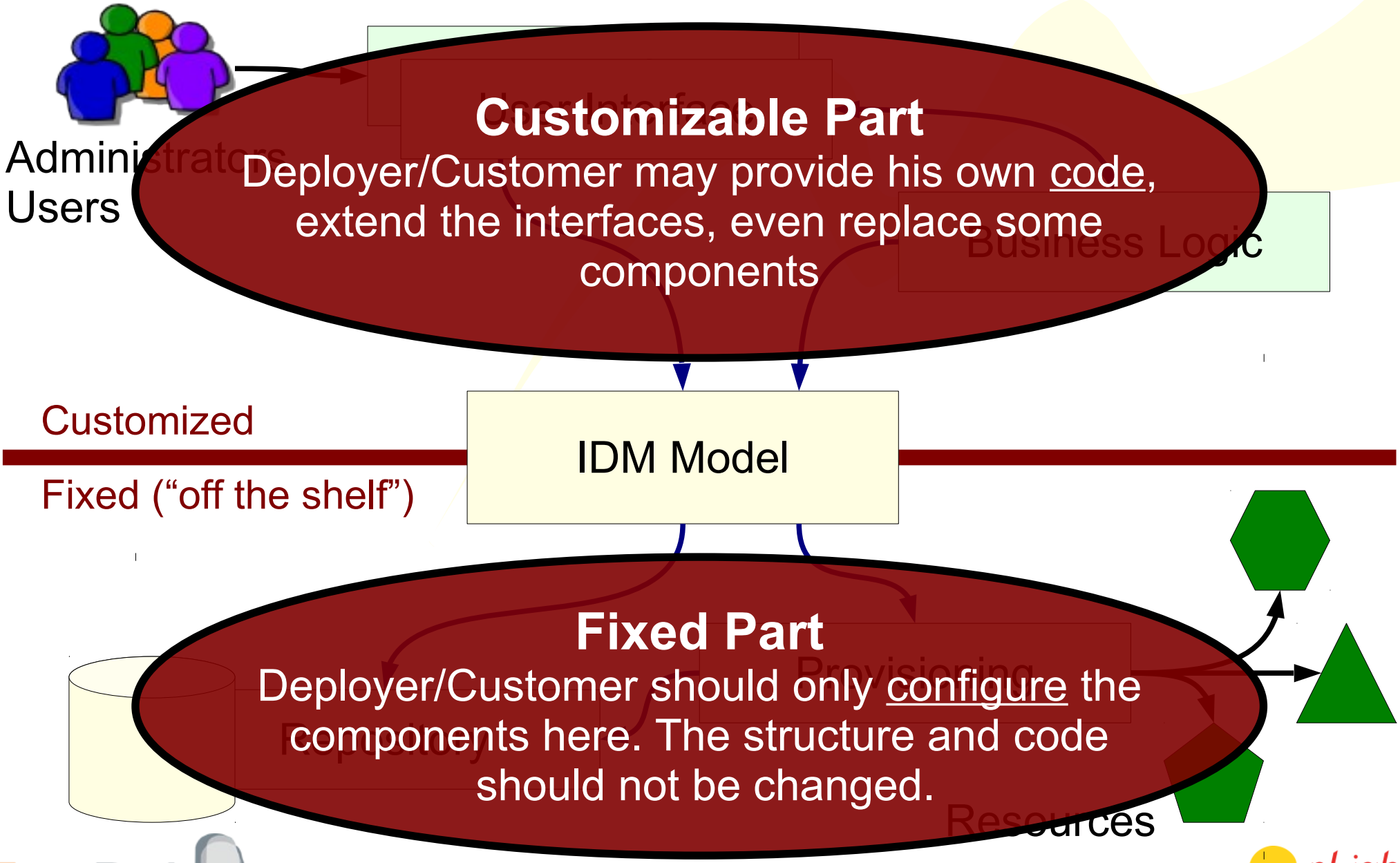
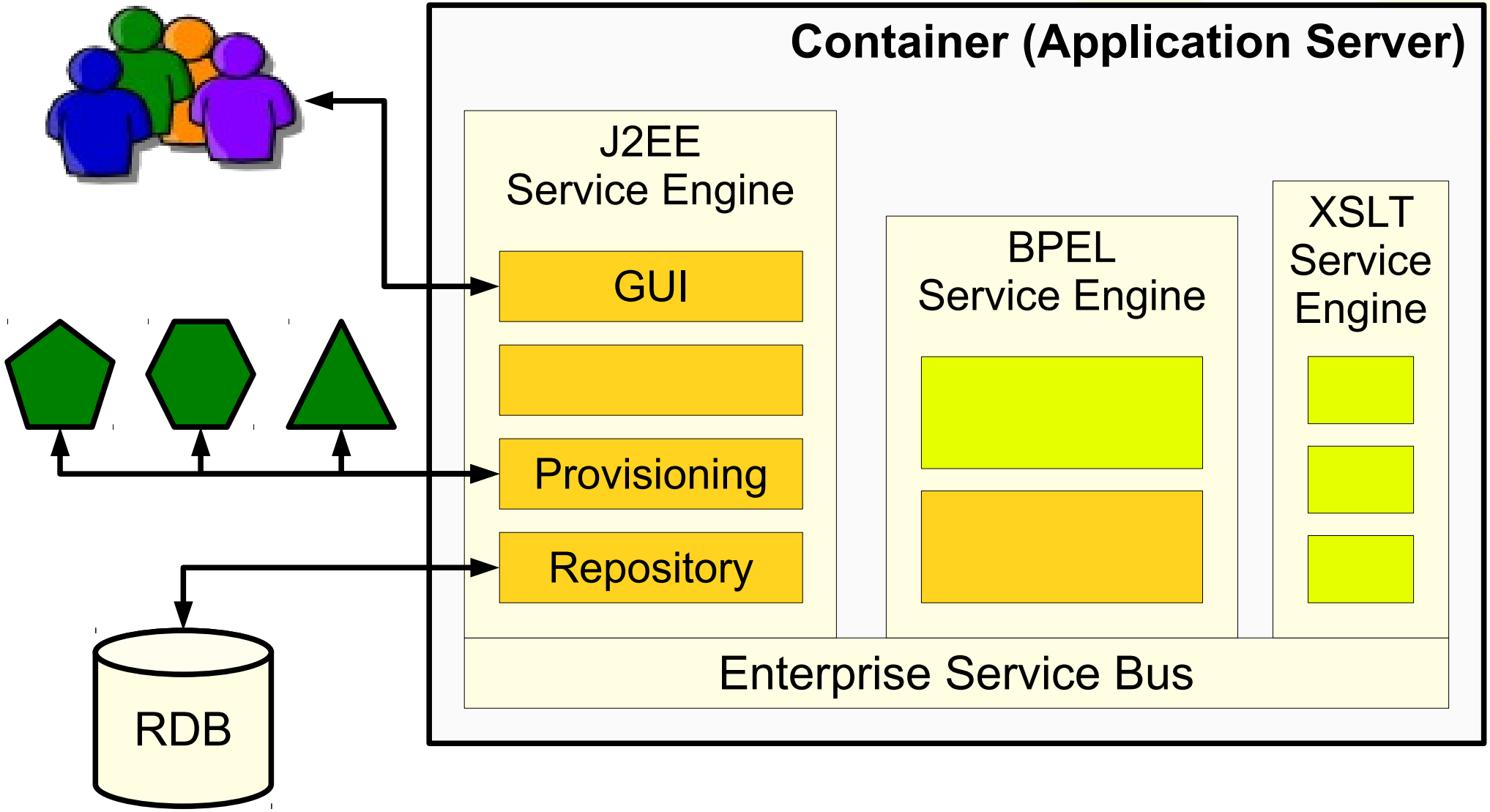
Abstract Architecture



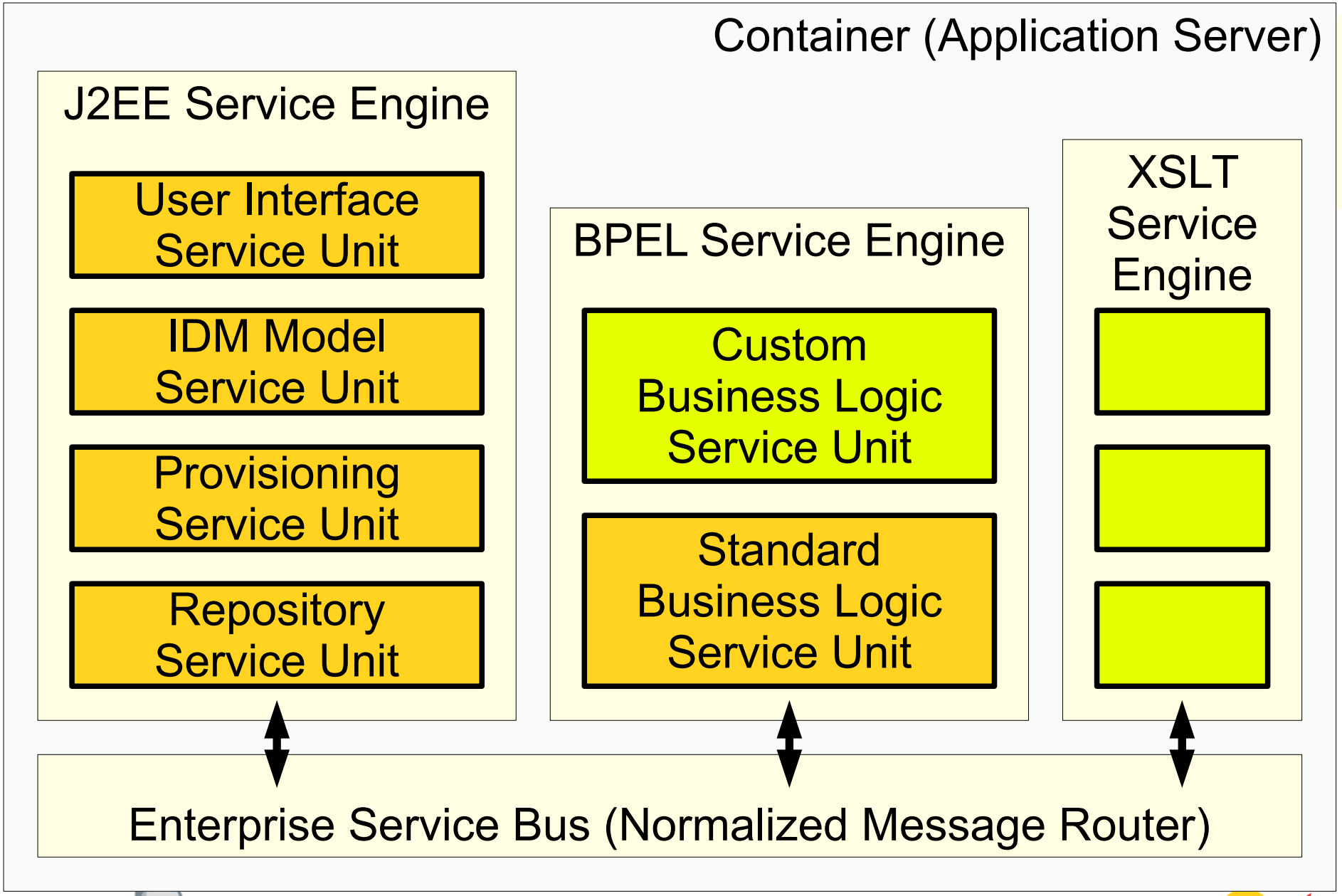
Abstract Architecture



Concrete Architecture (example)

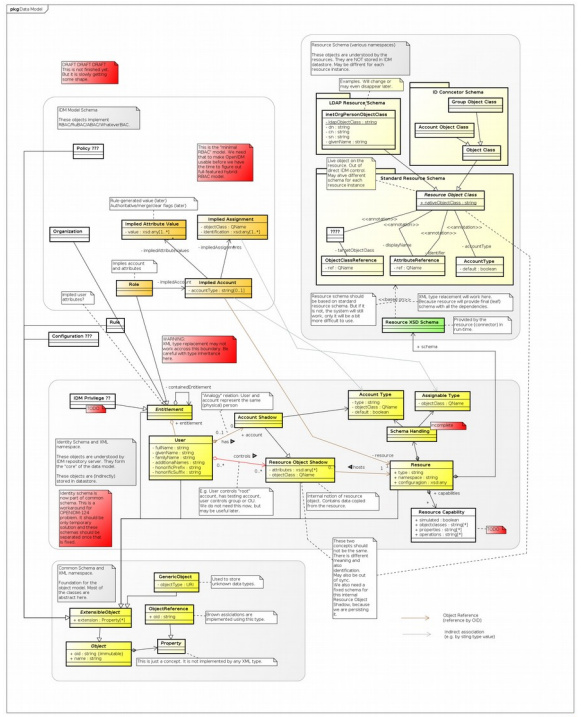


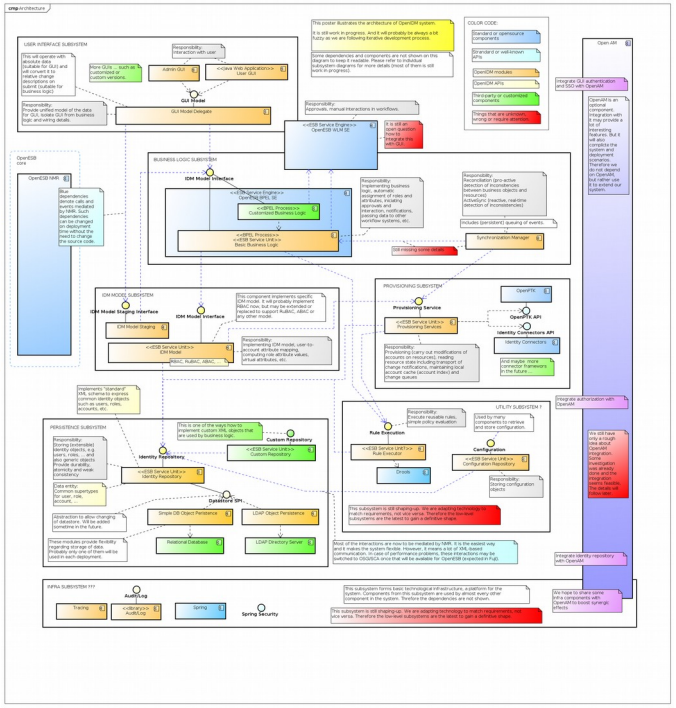
Concrete Architecture (example)

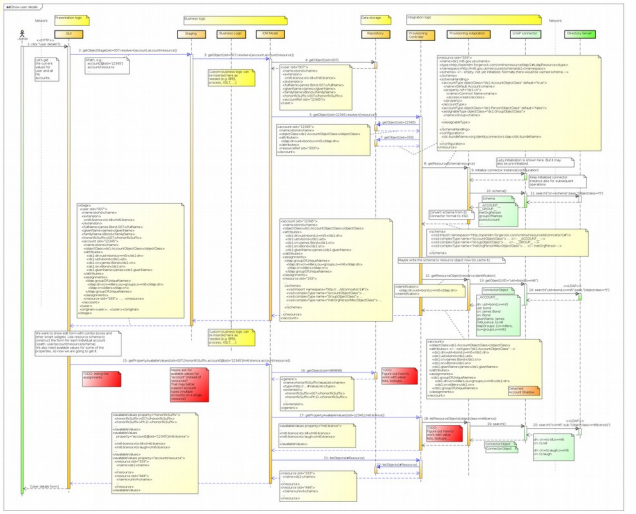


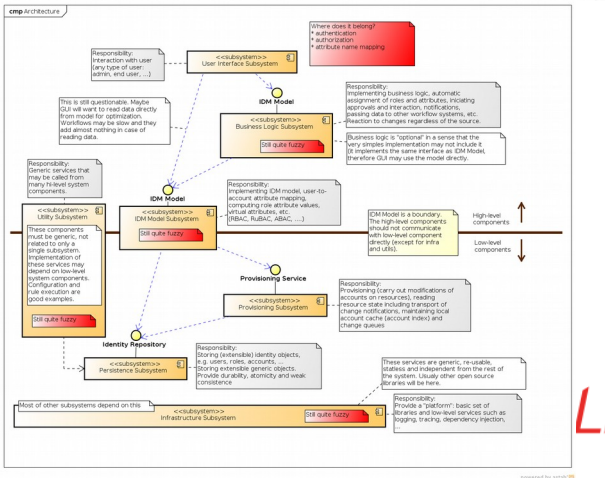
Even Bigger Pictures

- **UML Model (astah*)**
  - https://svn.forgerock.org/openidm/design

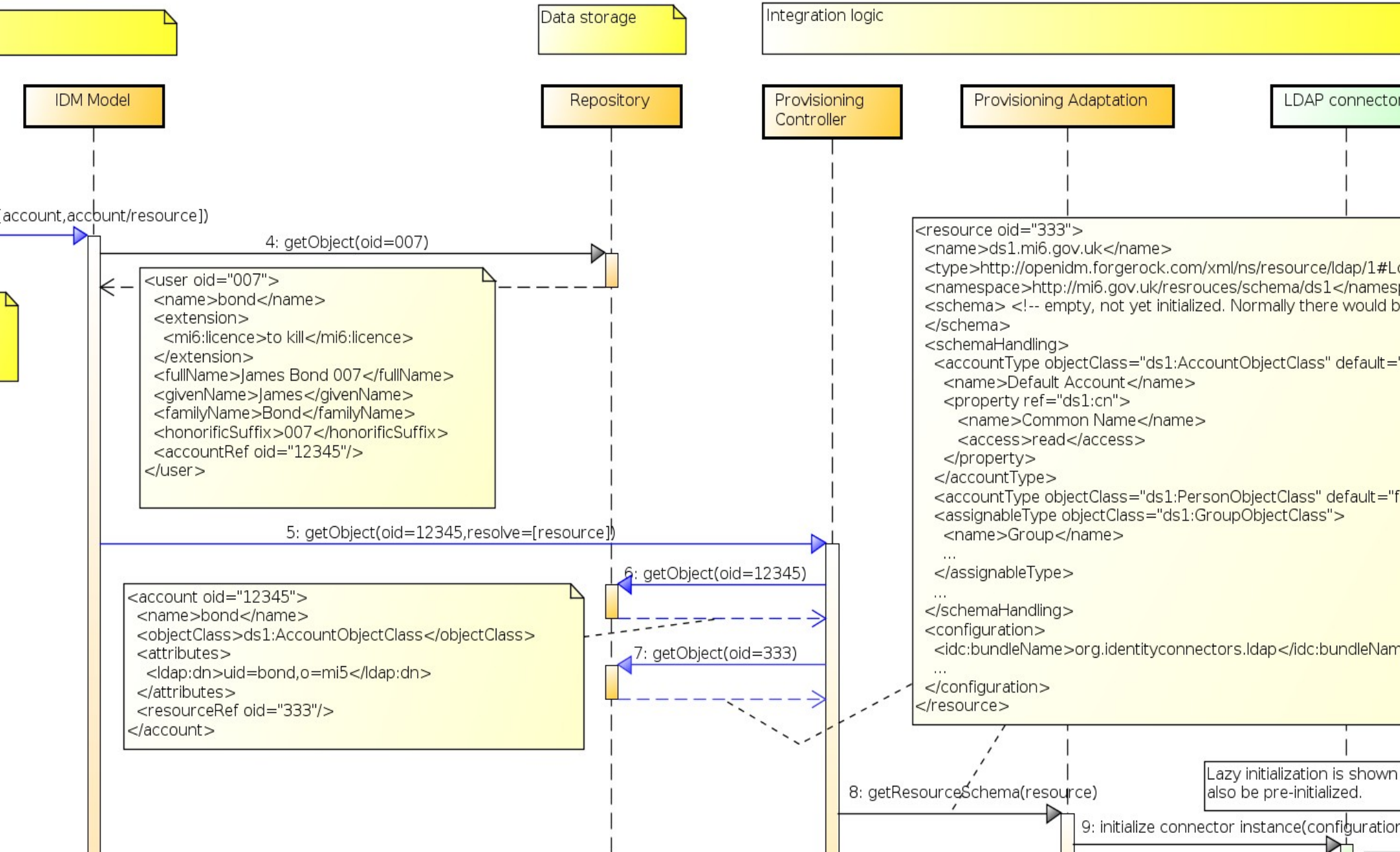








Even Bigger Pictures



(Much) More Information

- **OpenIDM Wiki**
  - https://wikis.forgerock.org/confluence/display/openidm/Home
- **[OpenIDM Architecture] in Wiki**
  - Wiki pages under [OpenIDM Architecture] page
  - “Live” architecture documentation
  - Includes UML diagrams
  - We try to keep it (reasonably) up to date
- **OpenIDM Mailing List**

OpenIDM Today

or What We Have Right Now

Current State

- **Architecture and almost all components in place**
- **Basic provisioning functionality works** (v1.6)
  - Platform: Glassfish/OpenESB v2 (for now)
- **Minimal automation**
  - Only synchronous BPEL workflows
  - Synchronization functionality almost done – testing (v1.7)
- **Advanced concepts roughly designed**
  - RBAC, Reconciliation, Auditing, Reporting

What Works

- **Read, create, update, delete of user and accounts**
- **Integration of Identity Connectors**
  - LDAP quite well tested, testing others right now
- **Synchronous BPEL processes**
- **Synchronization**
  - Testing it right now

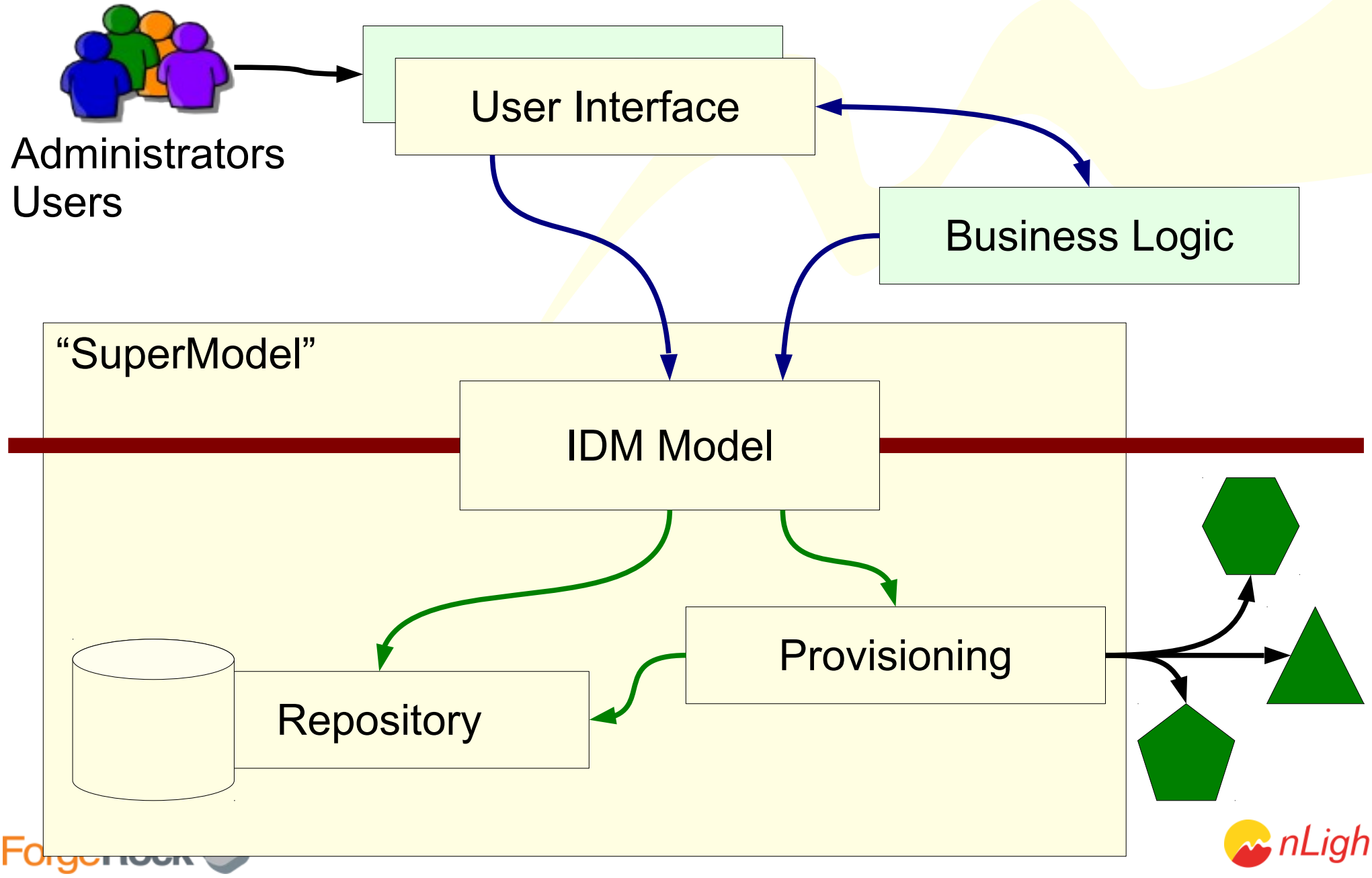
Releases

- **Snapshot 1.5: October 2010**
  - In fact a pre-release. Some basic provisioning
- **Snapshot 1.6: November 2010**
  - Basic “manual” provisioning (CRUD)
- **Snapshot 1.7: Real Soon Now ™**
  - Synchronization, Password Management

Some “Compromises” ...

- **OpenESBv2 and JAXB problems**
  - Slowing us down
  - Needed to change the deployment a bit

SuperModel Packaging



Some “Compromises” ...

- **OpenESBv2 and JAXB problems**
  - Slowing us down
  - Needed to change the deployment a bit
  - SuperModel packaging
    - May not be entirely wrong
    - In fact, this was quite expected

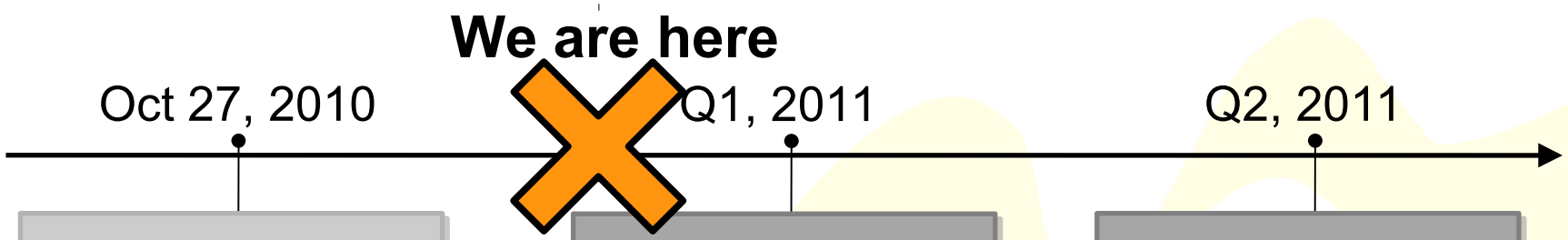
Some “Compromises” ...

- **Repository code is unmaintainable**
- **Some hardcoded things here and there**
  - Trying to keep track of them in Jira

Trunk: Always in a flux ...

- **There are always some bugs, bug fixing them quickly (hours)**
- **It is being stabilized right now**
  - The system is in testing now (feature freeze!)
- **Real usability expected soon (early 2011)**
  - Snapshot 1.7, Snapshot 2.0

Roadmap (2010-2011)



Snapshot 1.5

Features

- Core Architecture
- Integration with BPEL Workflow Service Engine
- Basic Provisioning and Account Administration

Core Framework for provisioning

Snapshot 2.0

Features

- Password Management
- Identity Synchronization with configurable Data Transformation Filters
- RACF Connector
- Tivoli Access Manager Connector
- End User Self-Service

ActiveSync and Password Management

Release 2.1

Features

- Delegated administration
- Reconciliation
- Auditing & Reporting
- Provisioning Event Model with BPEL based workflows
- Role Based Provisioning
- User Interface Improvements
- OpenPortal Connector
- OpenAM Connector
- OSGi Based Deployment

Full featured Identity Management system

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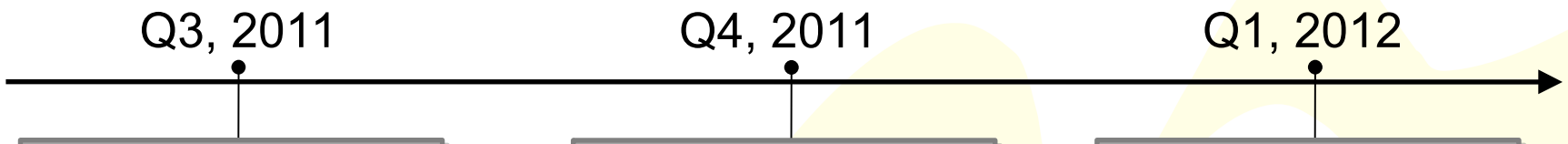
Roadmap (2011-2012)



Snapshot 2.2

Features

- Compliant Provisioning and SoD policy engine
- Attestation on entitlement carrying attributes
- Integrated Role Engineering
- JMX Monitoring
- Event listener
- WS-SecureConversation support
- Additional Connector support

No need for separate Role Management solution

Snapshot 3.0

Features

- JSR-268 Portlets for Self-Service and Account Administration
- Asynchronous provisioning
- Event tracking and statistic reporting
- Fine grained authorization (OpenAM Snapshot 12 (Q3 2011) Entitlements enhancements)
- Upgrade tool

Decoupled UI for easy Portal Deployment

Snapshot 3.1

Features

- Appliance deployment mode
- Migration and upgrade tool enhancements
- Open Source business intelligence integration
- Full SOA integration capability with external modules/vendors (OpenAM Snapshot 13 (targeted Q4 2011) Session impersonation and shadowing)
- Architecture

Identity & Access Intelligence

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OpenIDM Tomorrow

or The Lessons Learned

Immediate TODO

- **Repository needs rewrite**
  - Current repository: Result of a wild mix of misunderstanding and lack of time
- **Provisioning needs cleanup**
- **Maven components need review**
  - cleanup package and project names
- **Source tree structure documentation!**

Design TODO

- **Packaging & Deployment**
  - ESB, OSGi, OpenESB, …
- **Authentication/Authorization**
  - Admin GUI and End User GUI
- **RBAC**
- **Asynchronous things**
  - Approvals, async provisioning, …
- **Auditing & Reporting**

Smoother Development

- **Thou shalt not break the build!**
  - svn up; mvn clean install; svn commit
- **Document motivation** (in the code)
  - Why it was done like that?
- **Component maintainers**
  - Nobody can know everything, split the load
- **Using Jira**

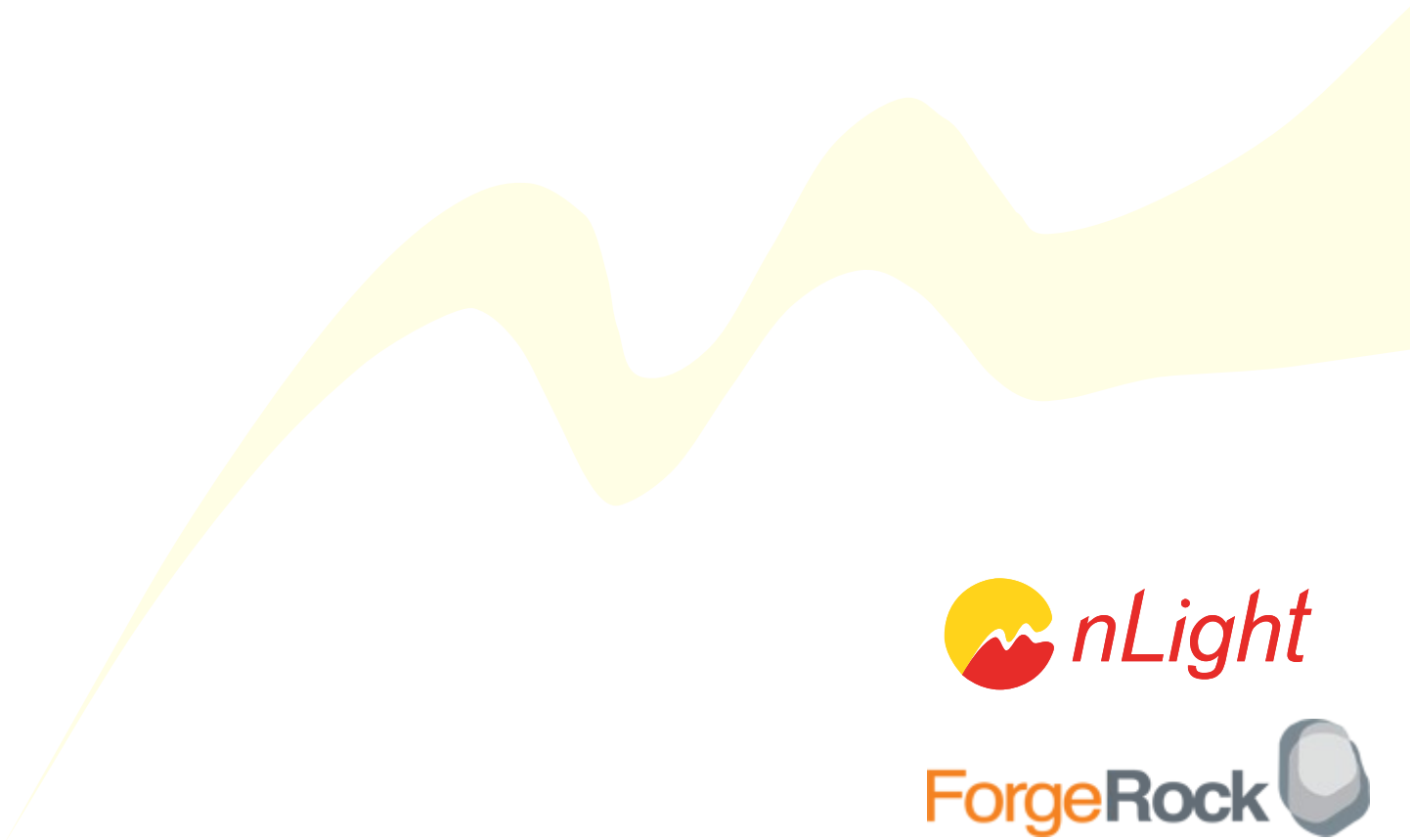
Need to ...

- **Open up the communication**
  - IRC? Mailing List?
- **Improve documentation**
  - I don't want to be the only writer here
- **Open up the design process**
  - How? Better participation from others
  - Reviews? Comments? … preferably before it is too late

Need ...

- **Release early, release <u>often</u>**
  - Regular and predictable release cycle
  - Be more SCRUM-like?
- **More (automated) testing**

Conclusion



OpenIDM Yesterday

- **Yesterday**
  - Good idea, good design, some code, something works
- **Today**
  - Building up, the system grows, starts to be usable
  - … yet there are some problems
- **Tomorrow**
  - Time to improve the code and regain speed
  - Time to improve the efficiency of development process

Overall ...

- A lot of work has been done
- It (mostly) works!
- We are going in the right direction
- Just need to do small adjustments
- … let's rock!

Questions and Answers

Thank You

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EXTRA SLIDES

Data Model

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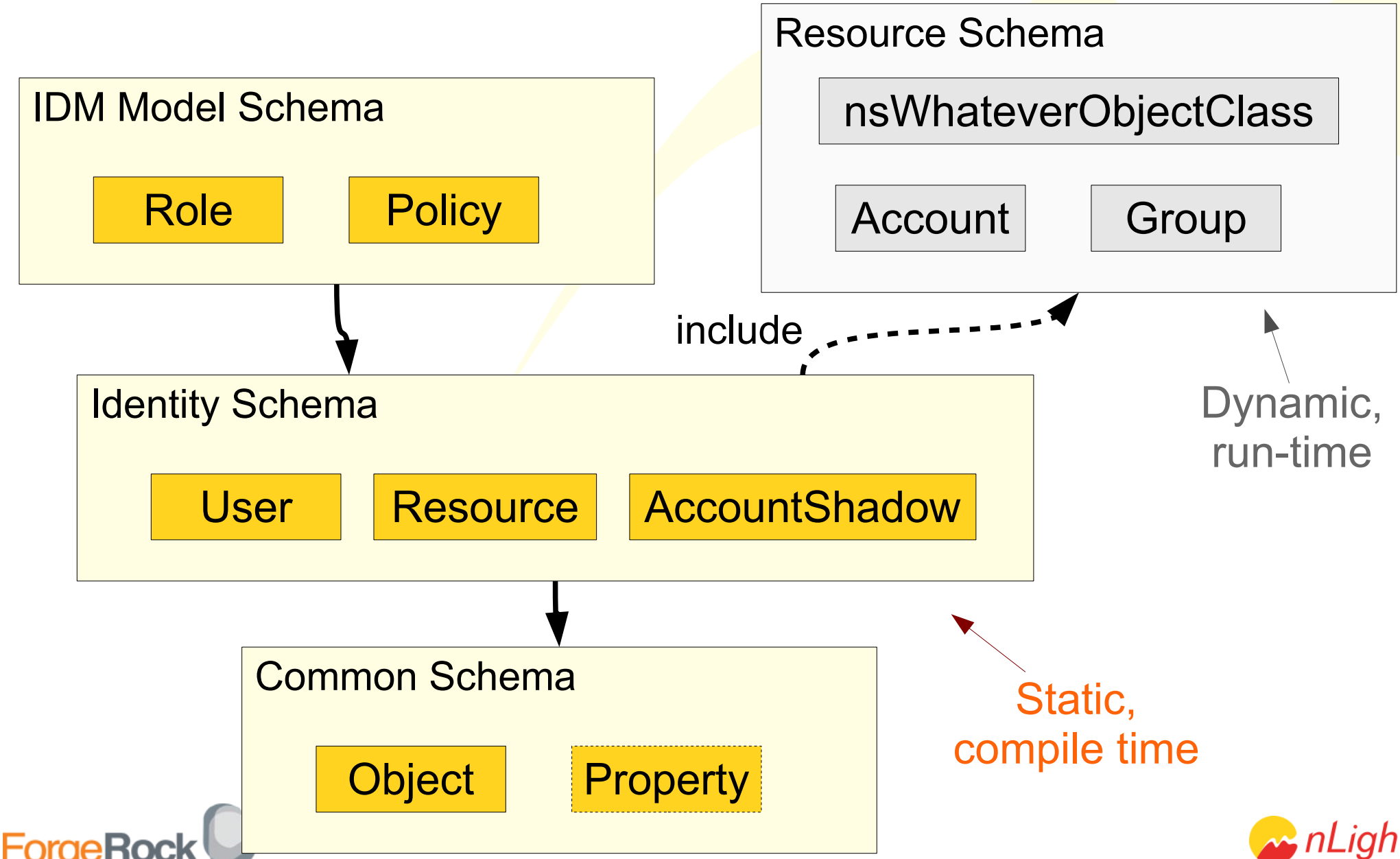
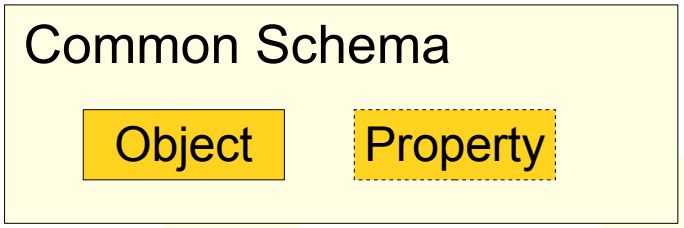
Data Model

- **Based on XSD schemas**
- **Extensible**
  - Using both XML type replacement and xsd:any
- **Separated to several partitions**
  - Common Schema
  - Identity Schema
  - IDM Model Schema
  - Resource Schema

Data Model Overview



Common Schema



- **Common concepts**
  - Object, Extensible Object, Generic Object, Property
  - Object changes, property references, …
- **Simple and generic**
  - Not specific to IDM problem domain
  - All components can understand the concepts from this schema

Objects and OID

- **Object (`ObjectType`)**
  - Everything that we can store and process is an Object
- **Objects are uniquely identified by OID**
  - OID = Object Identifier
  - Persistent, immutable, non-reassignable
  - Most likely UUID with optional domain suffix

Properties

- **Object have properties**
  - Properties are usually first-level XML elements

```
<user oid="007-2345-394728234-398540565">
  <name>bond</name>
  <fullName>James Bond</fullName>
  <givenName>James</givenName>
  <familyName>Bond</familyName>
  …
</user>
```

Properties

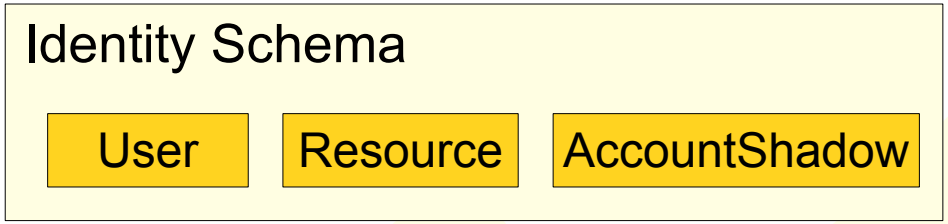
- **Properties are atomic**
  - They can be added, removed replaced – as a whole
  - Cannot be modified “inside”, only replaced
  - Properties are the “finest grain” that the system cares about (atoms)
  - The system does not understand (and does not care) about internal structure of a property

Objects and Properties

- Properties can be arbitrarily complex

```
<imaginaryObject oid="123456">
  <name>foobar</name>
  <fullName>Foo Bar</fullName>
  <foo:geekName>F00 B4r</foo:geekName>
  <pet:pet species="dog" breed="basset"
       name="Doggie"/>
  <com:shoppingPreferences>
      <com:tShirt size="XXL" color="#000000"/>
      <com:tie preference="no thanks"/>
  </com:shoppingPreferences>
</imaginaryObject>
```

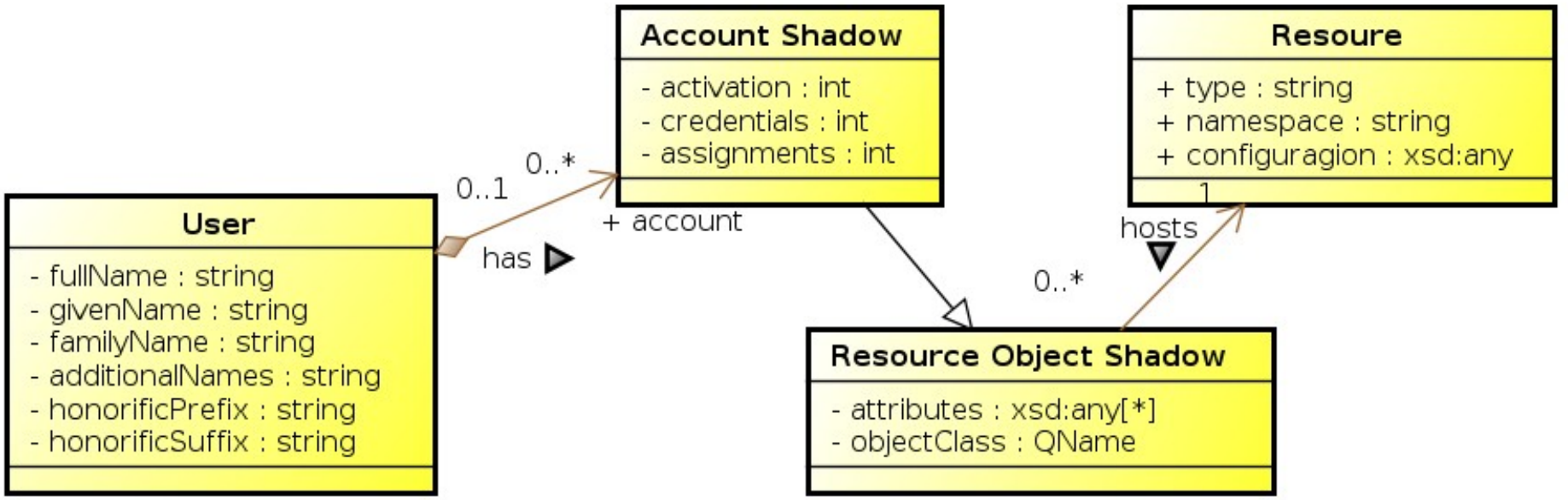
Identity Schema



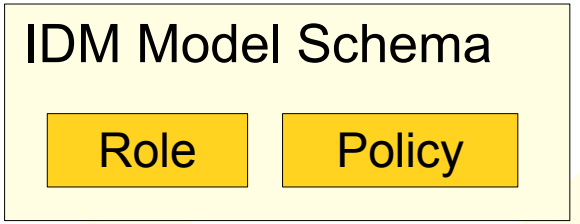
- **IDM-specific concepts**
  - User, Resource, ResourceObjectShadow, AccountShadow, Entitlement, …
- **Domain data model (“core”)**
  - Understood by provisioning (partially)
  - Fully understood by IDM Model and all components above
- **Reusable**
  - Independent of access control model and business logic

Basic Identity Schema Concepts

(simplified)



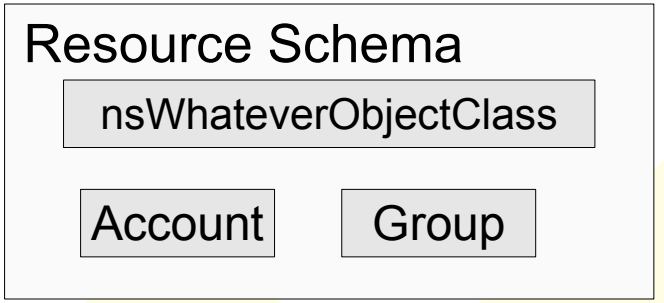
IDM Model Schema



- **Advanced IDM concepts**
  - Roles, Rules, Policies, Security Controls, Labels, ...
  - … or any other concept that is needed ...
- **Business-oriented**
  - Business logic (and GUI) is using these concepts
- **Theoretically interchangeable**
  - But the replacement won't be easy

WORK IN PROGRESS

Resource Schema



- **Resource-specific concepts**
  - Account, Group, nsRole, groupOfUniqeNames, location, department, … almost anything …
- **Specific to resource instance**
  - E.g. two Sun DSEE 6.3.1 servers may have different LDAP schema, therefore different resource schema
- **Available at run-time only**

Resource Schema Example
(idealistic)

```
<object xsi:type="ldap:InetOrgPersonObjectClass">
    <ldap:dn>uid=bond,o=mi5</ldap:dn>
    <ldap:uid>bond</ldap:uid>
    <ldap:cn>James Bond</ldap:cn>
    <ldap:sn>Bond</ldap:sn>
    <ldap:givenName>James</ldap:givenName>
    <ldap:ou>Agents</ldap:ou>
    <ldap:ou>Shooters</ldap:ou>
</object>
```

Resource Schema Example
(realistic)

```
<object xsi:type="ds1:AccountObjectClass">
   <ids:uid>12386-238947-349-209348</ids:uid>
   <ids:name>uid=bond,o=mi5</ids:name>
   <ds1:uid>bond</ds1:uid>
   <ds1:cn>James  Bond</ds1:cn>
   <ds1:sn>Bond</ds1:sn>
   <ds1:givenName>James</ds1:givenName>
</object>
```

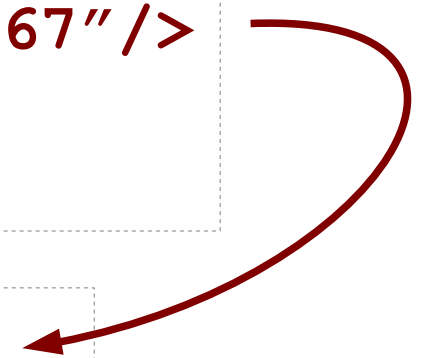
Implementation details of Identity Connectors Framework leak into the schema (ids: namespace above)

Object References

- **Implement associations between objects**
  - E.g. account belongs to a user

```
<user oid="007-7777-777”>
  <name>bond</name>
  ...
  <accountRef oid=”1234-4567”/>
  ...
</user>
```

```
<account oid="1234-4567”>
  <name>jbond</name>
  ...
</account>
```



Composite Objects

- Alternative way how to represent associations

```
<user oid="007-7777-777”>
  <name>bond</name>
  ...
  <account oid="1234-4567”>
    <name>jbond</name>
    ...
  </account>
  ...
</user>
```

- Similar to “view” in Sun IDM, but cleaner, unified principle ... and more flexible.

Object References and Composite Objects

- **Easy to convert one to the other**
- **Object references are used in the repository**
  - Normal database forms, store object in one place
- **Composite objects used in business logic**
  - But references are also occasionally used in business logic (for optimizations)

Pure XML

- **Everything is pure XML and XSD**
  - No meta-schema or schema-on-top-of-schema
  - Property types defined by schema
    - xsd:simpleType, xsd:complexType
  - Single/mutli-valued properties defined by schema
    - minOccurs, maxOccurs
  - Using XSD annotations to extend XSD when needed
- **We try to avoid hacks as much as we can**

Extensibility

- **Extending existing object type**
  - Using <extension> element
- **Creating new object type**
  - Using `GenericObjectType`
    - Practical, but slightly inconvenient
  - Using XML type replacement
    - Theoretical, problematic

Extending Existing Objects

- **<extension> element**
  - All “normal” objects have <extension> element of xsd:any type
    - Defined in `ExtensibleObjectType` supertype
  - <extension> may contain any non-standard properties
- **Ignored by low-level system components**
- **May be used by business logic**

<extension> Example

```
<user oid="d3ad-m3a4-4758-39488740" version="42">
  <name>foobar</name>
  <extension>
    <foo:geekName>F00 B4r</foo:geekName>
    <org:guild>Societus Geekus Europeus</org:guild>
    <org:guild>Basset User Group</org:guild>
  </extension>
  <fullName>Foo Bar</fullName>
  <givenName>Foo</givenName>
  <familyName>Bar</familyName>
  ...
</user>
```

Subsystems

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User Interface Subsystem

- **End User and Administration interfaces**
- **Based on JSF2/IceFaces**
  - "Web 2.0", RIA, AJAX, … and similar buzzwords
- **Should provide reasonable functionality**
  - Smart components to display well-formatted data based on XSD schema
- **We expect customization and extension**

User Interface Customization

- **Now: We are open source**
  - Just get the sources and tweak them
- **Later: Form objects or artifacts to customize the UI without programming**
- **UI can be replaced or substantially extended**
  - E.g. replace End User interface with portlets
  - UI is built on top of well-defined interfaces

Business Logic Subsystem

- **“Empty” by default**
- **ESB-based extensibility**
  - Well-defined interface of IDM Model
- **Lot of options to choose from (service engines)**
  - BPEL – the usual suspect
  - Java (J2EE, POJO) – the classic
  - XSLT – for simple things
  - …

IDM Model Subsystem

- **Provides unified façade to User Interface and Business Logic**
  - It is a boundary between high-level and low-level part of the system
- **Processes policies, Role-based models (RBAC), virtual attributes, …**
  - … whatever that can be reasonably formalized to a model

IDM Model Subsystem

- **Managed Object Types**
  - Role
  - Rules (most likely, but that is still TBD)
  - Policy
  - …

Note: This is still work in progress.

Default IDM Model

- **The IDM Model that will be shipped with OpenIDM**
  - Will influence the User Interface and most deployments
  - Should support 80% of cases with 20% of complexity
- **Still TBD, but most probably hybrid RBAC model**
  - Roles (hierarchical) combined with rules

Null IDM Model

- **Does "nothing"**
  - No roles, no policies, no virtual attributes … nothing
- **Expects that business logic does everything**
- **Can be used in heavily-customized deployments**
  - … and also for testing!

IDM Model Replacement

- **IDM Model can theoretically be replaced**
- **But such replacement will be difficult**
  - User Interface depends on the model
  - Business Logic depends on the model
- **Still may be needed for some extreme deployments**

Provisioning Subsystem

- **Integration Logic**
  - Business logic should **not** be here
- **Communicates with other systems (resources)**
  - Protocol adapter, schema converter
- **Describe the options, but do not decide**
  - List object classes, describe schema, ...
  - It is the IDM Model and Business Logic that decides

Provisioning Subsystem

- **Managed Object Types**
  - Resource Object Shadow (and subtypes)
  - Resource
- **Pluggable and configurable design**
  - We need great deal of flexibility there
  - But we want to avoid programming
    - This is targeted at operations staff (admins), not developers

Identity Connectors Framework

- **Sun open-source framework**
- **The architecture is not ideal**
  - We will need an adaptation layer on top of it
- **The future under Oracle is questionable**
- **Supports a good set of resources**
- **We will use it, at least for now**
  - But we will need a long-term solution

Persistence Subsystem

- **Provides object repository**
  - Storing, retrieving and modification of objects
  - Atomicity, consistency – some details still TBD
- **Based on relational database now**
  - JPA/Hibernate
- **Can support even different stores later**
  - Especially LDAP
- **Possible integration with OpenAM**

Open and Dynamic Development

- **Completely open development**
  - Public task tracking (Jira)
  - Public communication (mailing lists, wiki)
  - Public planning (roadmap, Jira)
- **User (customer) participation**
  - Customer needs take precedence
  - The roadmap can be adapted to match real needs

Open Discussion

nLight

Complications and Open Questions

- **IDM Model design**
- **Workflow persistence**
- **Human interaction (approvals)**
  - … and long-running business processes
- **Asynchronous provisioning**
- **Replacement for Identity Connectors**

Extra Slide: Notes and TODO

- **TODO**
  - Describe synchronization and reconciliation
  - More about RBAC