The CDO Model Repository

Perfect for the Enterprise

Enterprise Modeling Day, Zurich, October 28, 2010
- Huge models require lots of smaller files
- Partitioning must be done at design time
- Saving changes is not transactional safe
- Loading single objects is still impossible
- Garbage collection of objects is impossible
- Conflicts must be resolved in text form
- No change notifications to other clients
Does not scale well

Not suitable for multi-user
Modify

EMF Application

Model Repository

EMF Application

EMF Application
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Model Repository

Load

EMF Application

EMF Application

EMF Application
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Client / Server
Embedded Repository
Embedded Session
Offline Clone (Embedded)
Offline Clone (Group Server)

Client
- Application
- CDOSession

Clone Server
- IStore
- OfflineClone
- Synchronizer
- ISession
- CDOSession

Master Server
- IStore
- MasterRepository
- ISession

DB
Fail-Over Monitor (1)
Fail-Over Monitor (2)
Fail-Over Session

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Offline Workspace (Checkout)
Offline Workspace (Checkout)

Client

Application

CDOWorkspace

Local Session

Local Repository

IStore

DB
Offline Workspace (Checkout)
CDO is a runtime technology. People embed it into their products.

1. Persistent data **must** be kept safe and consistent.

2. All functionality **must** scale well with model size.

3. All components **must** be customizeable.

4. All default implementations **should** perform well.
CDO Core Features
Distribution

- Various ways to set up an IRepository
  - XML config file, programmatically, Spring, ...
  - OSGi, stand-alone, ...
  - All components customizeable

- Various ways to open a CDOSession
  - Net4j: TCP, HTTP, embedded, ...
  - CDO: embedded
  - Other transports possible

- Offline mode
  - Cloned and sync’ed repository, normal sessions
Persistence

- **Pluggable storage backend adapters (IStores)**
  - DBStore (CDO’s own O/R mapper)
  - HibernateStore / Teneo
  - ObjectivityStore
  - DB4OStore
  - MEMStore
- **Changing the store type does not affect client applications!**
Resources

- A CDOResource is anEObject
- A repository contains CDOResourceNodes
  - CDOResourceFolders
  - CDOResources
  - CDOTextResource (coming soon)
  - CDOBinaryResource (coming soon)
- The resource tree is
  - Navigable through EMF
  - Queryable through CDO
Versioning

- **CDO supports record temporality**
  - Must be supported by IStore
  - Can be configured per IRepository

- **CDO supports branching**
  - Must be supported by IStore
  - Can be configured per IRepository

- **A CDOView provides consistent graphs**
  - From a particular branch
  - From a particular point in time
Scalability

- Lazy loading at object granule
- Lazy loading without container object
- Partial collection loading, chunking
- Adaptive prefetching
- Manual prefetching
- Automatic unloading at object granule
- On demand streaming of large objects
Queries

- CDO includes a generic query framework
  - Supports any query language
  - Supports named parameters
  - Supports synchronous execution
  - Supports asynchronous execution

- Query language handlers can be
  - plugged into an IRepository
  - implemented by an IStore (SQL, HQL, custom, ...)

- Handlers provided for OCL and XRefs
Transactionality

- Strong transactional safety at model-level
- Multiple transactions per session
- Multiple save points per transaction
- Rollback to any save point
- Commit with progress monitoring
- Hooks for custom transaction handlers
- Conflict detection and fail-early-transactions
- Pluggable conflict resolvers
- Explicit read/write locking on object granule
- XA transactions to multiple repositories
Collaboration

- **Passive Updates**
  - Asynchronous commit notifications
  - Invalidation of objects, lazy reload if needed
  - Can be switched off per session

- **Change subscriptions**
  - Asynchronous change delta delivery
  - Registration with repository per object/adapter
  - Automated through pluggable adapter policies

- **Remote session manager**
  - Notifies about state of other sessions
  - Supports sending/receiving of arbitrary messages
Integration

- Integrates with EMF at the model level, not at the edit- or UI-level.
- Uninvasive to the .ecore file.
- Best results with regenerated models (native)
- Regeneration not needed (legacy mode)
- Dynamic models supported
- Multiple repositories per ResourceSet
- External references
Dawn – Rise of Graphical Collaboration
Dawn – Rise of Graphical Collaboration

- **Conflict handling**
  - Dawn provides detection and handling mechanisms for conflicts
  - It will build on the CDO conflict mechanisms and provide flexible and intuitive UI to handle conflicts
  - Conflicts are displayed inside the diagram editor. Conflicts that cannot be visualized inside the editor will be shown in a special view (Dawn Conflict View)

- **Locking**
  - Dawn will support locking on different hierarchy levels in the GMF diagram
  - Locked objects are marked with special visualisations

- **WebViewer/WebEditor**
  - Dawn provides a web viewer to view changes in the diagram while they are processed in Eclipse
  - It also will support changing the diagram (adding/deleting/manipulating) in a browser
  - Allows editing GMF-diagrams on mobile devices even if no Java platform is installed
Dawn – Rise of Graphical Collaboration

- Do not change existing code
  - A dynamic design and a flexible generator will make it possible to “collaborate” existing GMF editors even if the source is
  - Existing editor do not need to modified
- Firewall transparency mode
  - Allows to operate from within restricted networks
  - This mode will use a web-based protocol on CDO
- Network independence (Offline Mode)
  - Using one of the latest CDO features (offline support) Dawn will allow modifying GMF diagrams without a repository connection.
- Authentication/Authorization
  - Providing access rights on diagram level will allow to protect your model data
  - Additionally the use of the diagram (show, modify, view) will be restrictable. Locking behaviour can also be influenced.