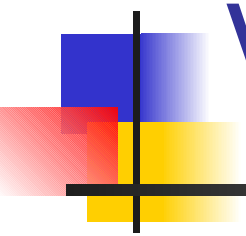

WS-Workspace: Workspace Versioning for Web Services

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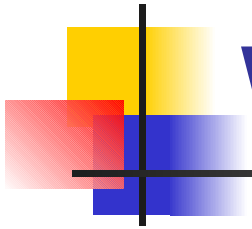
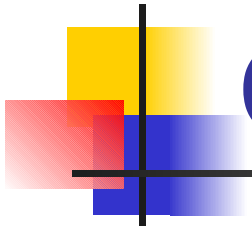


Web Data Access Evolution

- Static Document Navigation
  - Read my product brochures
- Data Driven Information Navigation
  - Access and search my product catalog
- Secure Form Processing
  - Make online orders from my catalog
- Data Authoring and Manipulation
  - Update my catalog

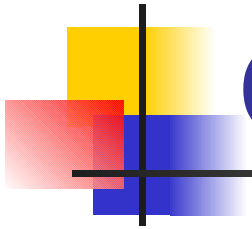
Complex Objects Authored from the Web

- Online catalogues
- Sales call reports
- Class schedules
- Tax returns
- Business rules
- Bill of Materials
- EMAIL filter rules
- Photo Albums
- Request for Proposals
- RFP Responses
- Employee Schedules
- Inventory Descriptions
- Job Assignments
- Travel Itineraries
- Work-flow definitions
- Circuit Designs
- Systems and Application Software
- Web site content



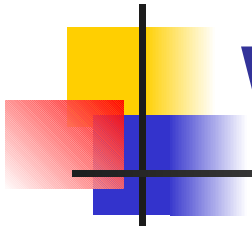
Complex Authoring Attributes

- Takes a long time: hours, days, months
- Need to gather information from multiple sources
- Need to collaborate with others
- Need to get approval from boss or CFO
- May want to debug/test/try it out/what if analysis before publishing it



Complex Authoring Attributes

- Want to undo mistakes
- Want to track all changes with the user and with both physical and semantic information
- May want a custom user interface

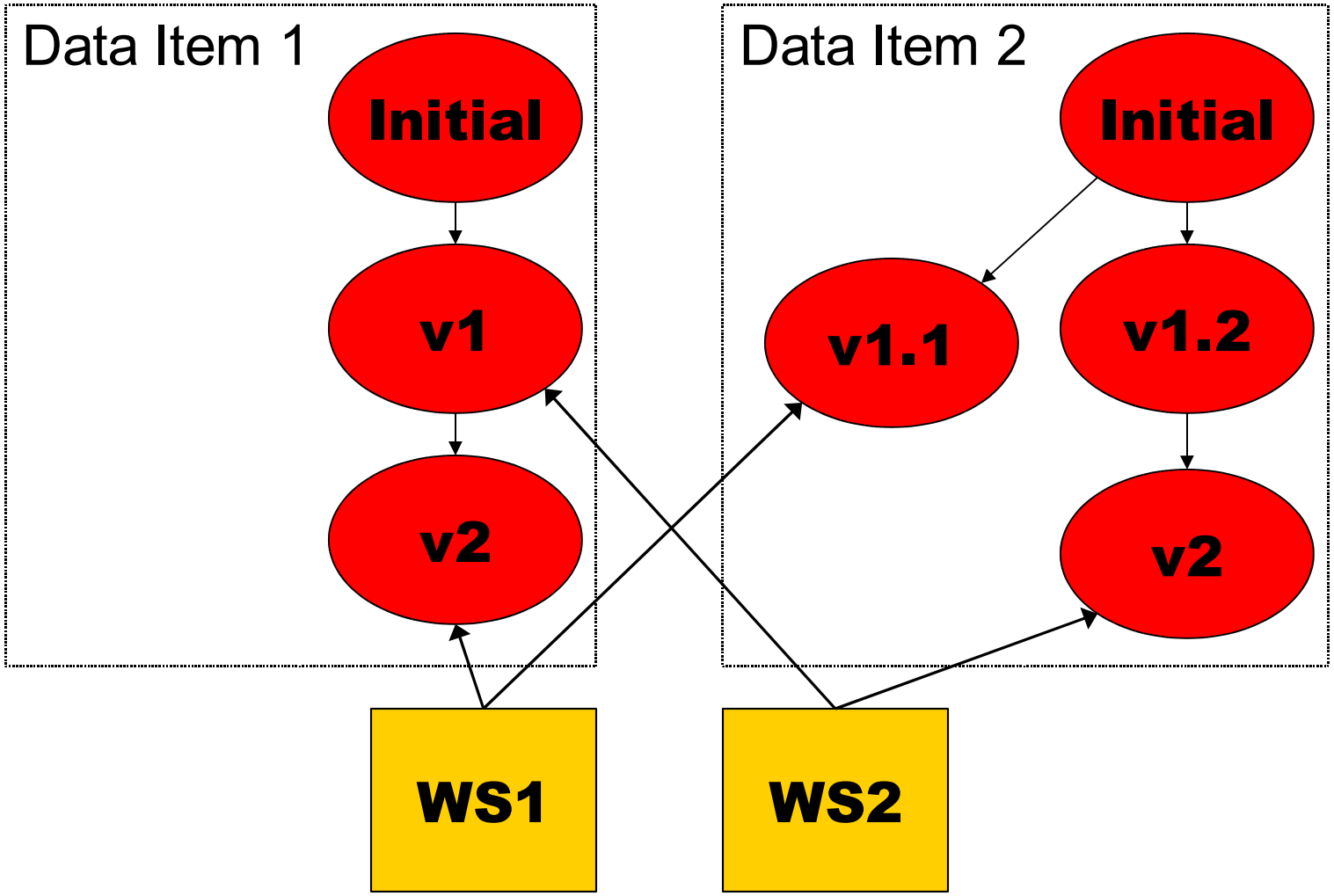


Workspace Versioning

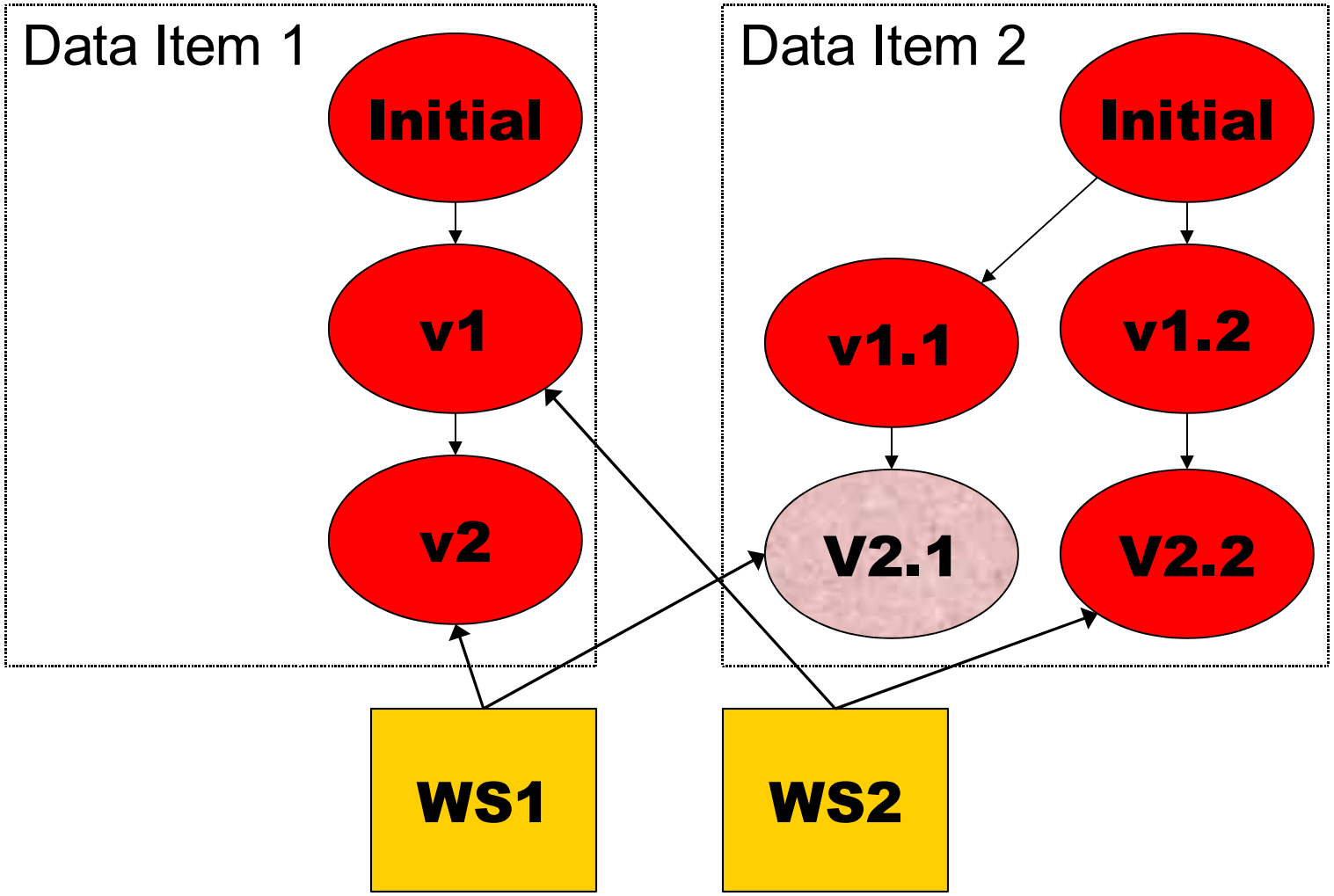
Can addresses all problems but the last

- Each user gets their own workspace based on the current version of the world
- The user's changes affect no one not using the workspace until the workspace is published
- Optionally the world's changes do not affect the user until the workspace is updated
- Has been around for years for engineering data. Web accessible CAE is now common.

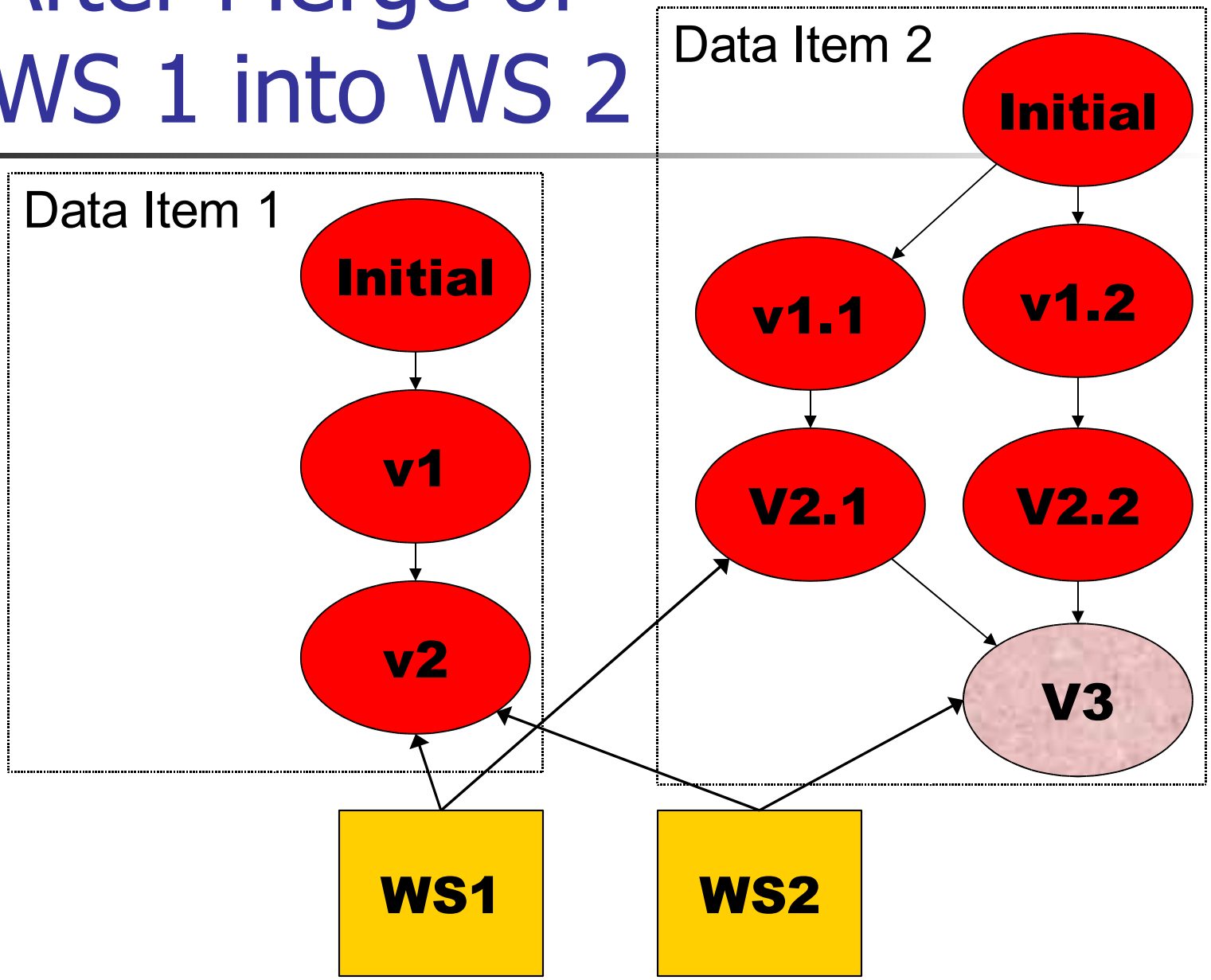
Workspace Versioning

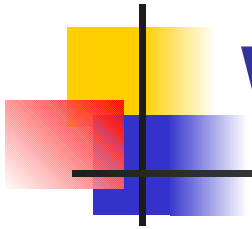


After Data Item 2 Updated in WS 1 Context



After Merge of WS 1 into WS 2

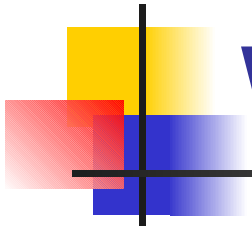




Web Workspace Paradigm*

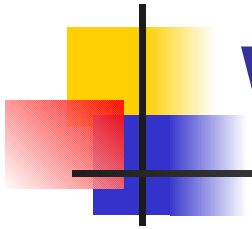
- Put Workspace versioning under every authoring application
- Track user, URL, and provided reason for each change
- Put undo/redo and share buttons along with the submit button
- Keep it simple so that you don’t have to be an engineer to use it

*WISE, 12 Dec 2003



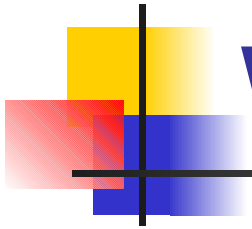
Web Workspace Paradigm

- Make it easy for application designers to offer full featured authoring to their users
- Make it easy for data services to offer workspace versioning to their applications
- **Add it to the application server and service composition architecture**



WS-Workspace Protocol

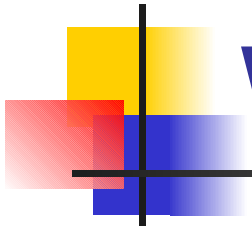
- Facilitates composing web services that manipulate authored data
- Built on WS-Coordination
- Piggybacks workspace information onto each web service request
- Each request acts in the context of the workspace, making new versions of any updated objects



WS-Coordination

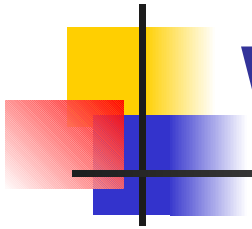
- WS-Coordination (IBM/MS) provides the basis for orthogonal control where each message includes context that includes a port for communication with the coordinator
- Used for building traditional or LR/Business Transactions, or performance tracking*
- WS-CAF (Oracle/Sun/Iona) is similar but it separates the call context (WS-CTX) from the coordination (WS-CF) protocols

*Werner Vogels, ICSOC 2003



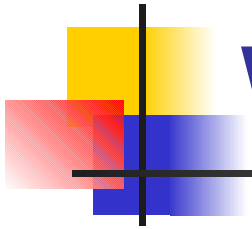
WS-Workspace Protocol

- Each workspace is assigned to one coordinator
- Coordinator has stable storage to store workspace state and operation log
- Each data service responsible for implementing workspace versioning on its own data in its own way



WS-Workspace Protocol

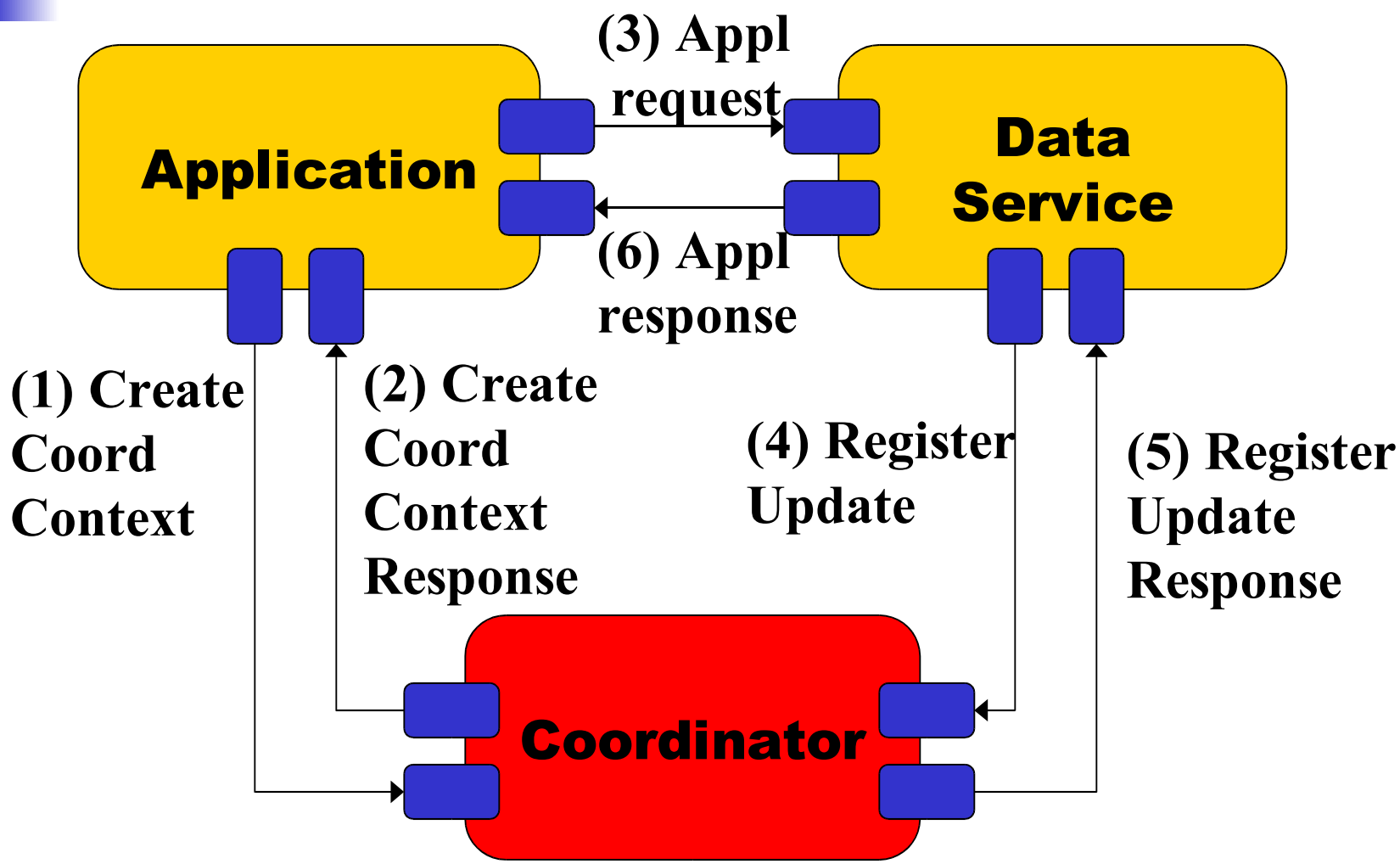
- Coordinator called by data service to record updates in a 2 party distributed transaction on data service and coordinator operation log
- Merge runs as a multi-party distributed transaction on each involved data service and each workspace coordinator service



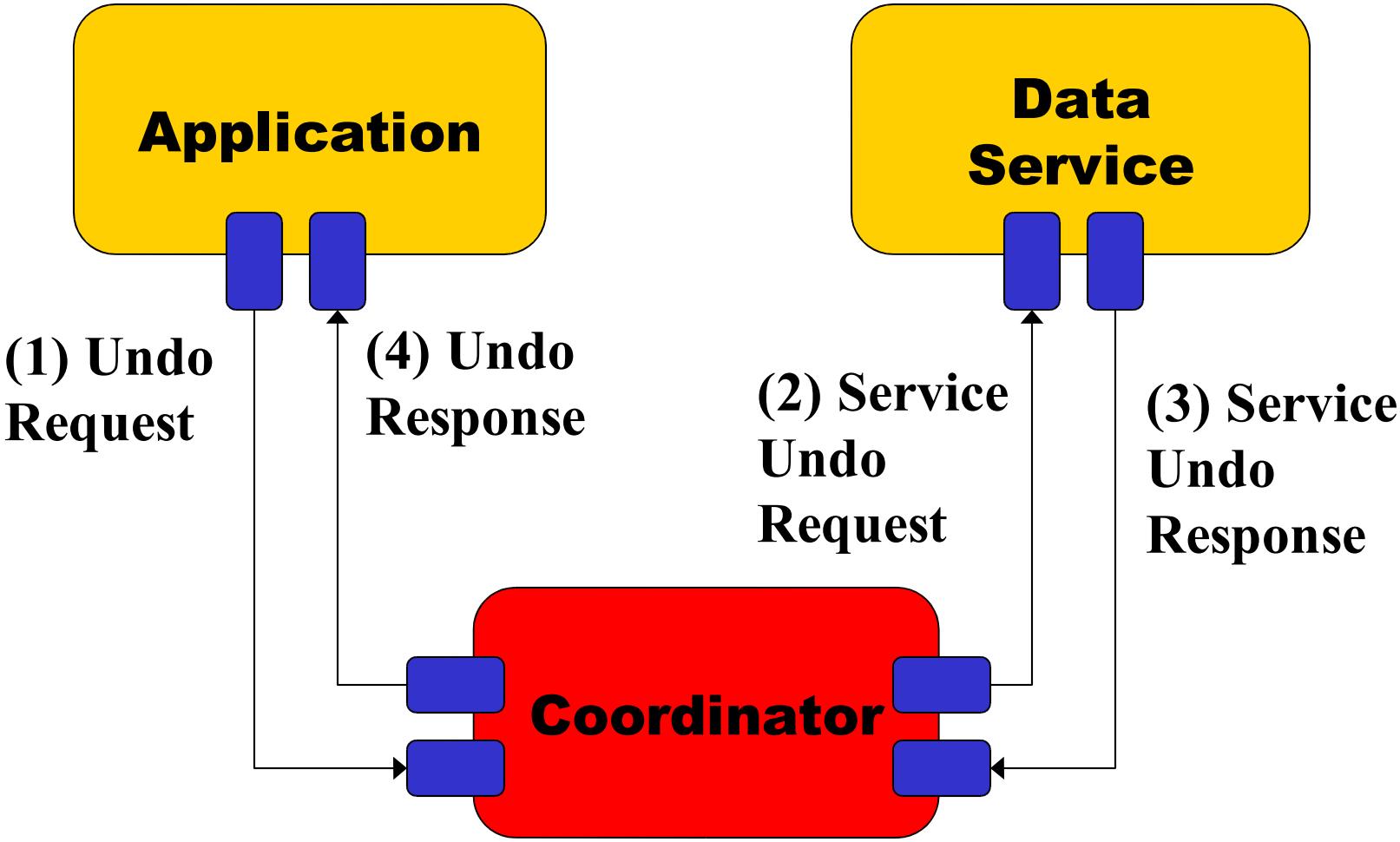
WS-Coordinator Protocol

- Undo operations are executed by having the coordinator look in the operation log and call the appropriate data store to perform the undo
- Each data entity, e.g. Table/Object Type/Subdirectory can be versioned or not. This is determined by Data Service

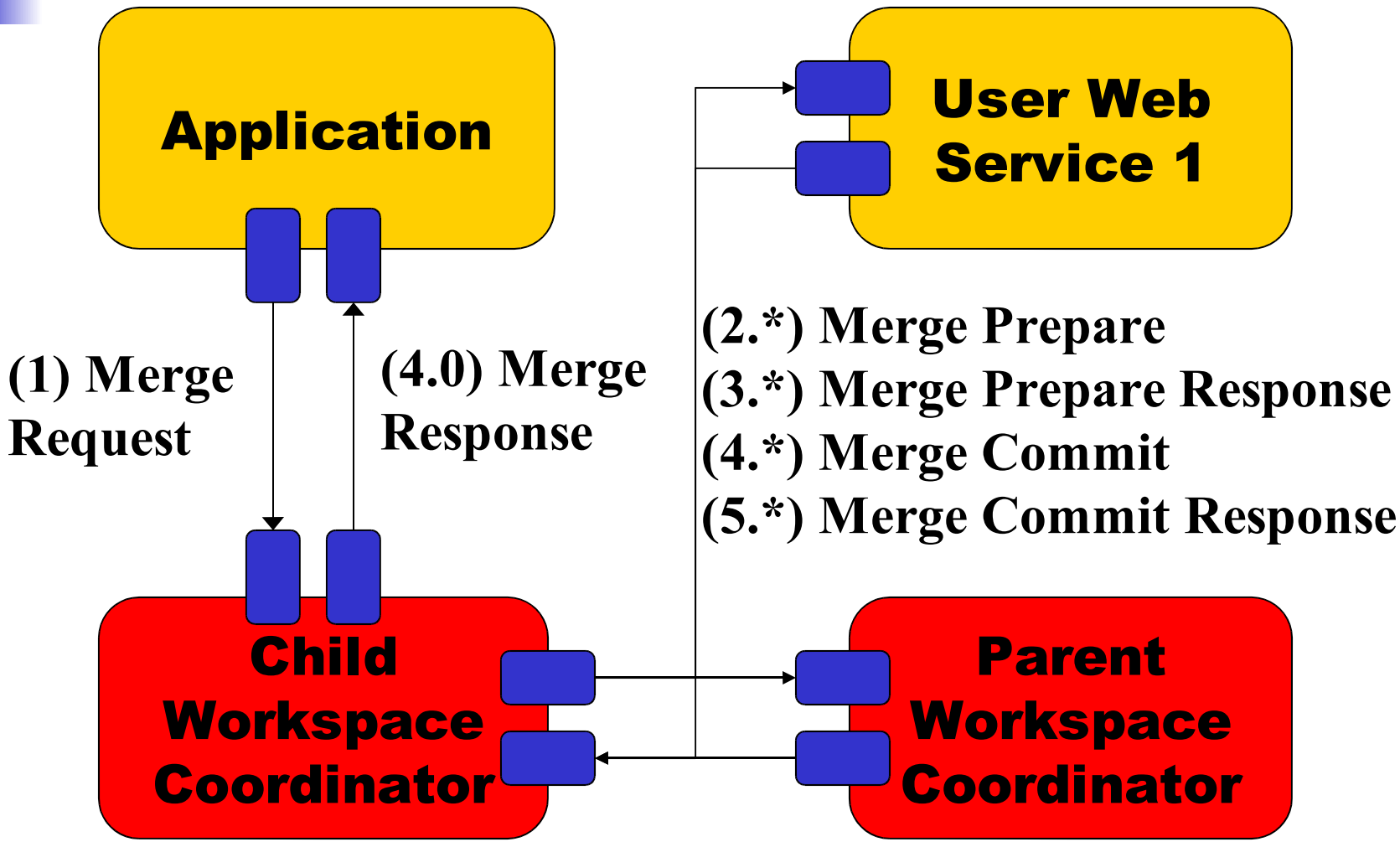
Making an Update



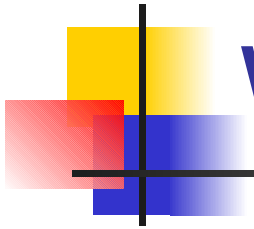
Performing Undo



Performing a Workspace Merge Operation

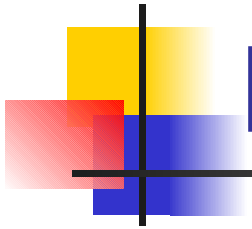


Data Sources that Support Workspace Versioning

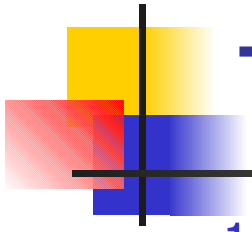


- Oracle Workspace Manager: Versioned Relational Database
- Microsoft Metadata Server (aka Repository): Versioned Object System
- IBM/Rational Clearcase, CVS: Versioned file system
- They are tricky to write and currently have a limited market

WS-Workspace vs. Long Running Business Transaction

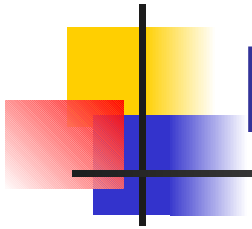


- WS-Workspace can be used to implement an optimistic Long Running Transaction with Isolation. But …
- WS-Workspace is more expensive if versioning is not needed
- WS-Workspace works well only on low update rate data, get merge conflicts on high update rate data



Theses

1. Good authoring support requires web applications to change the way they manipulate data
2. Workspace Versioning is an appropriate tool to apply to web based authoring
3. The WS-Workspace protocol can be used to build distributed applications using the Web Workspace Paradigm



Future Plans

- Implement it! Use it! Evaluate it!
- Interaction of WS-Workspace merge operations and LRT. Can associate a LRT with workspace that commits when merge is done
- Implement WS-Workspace operations as nested WS-Transaction