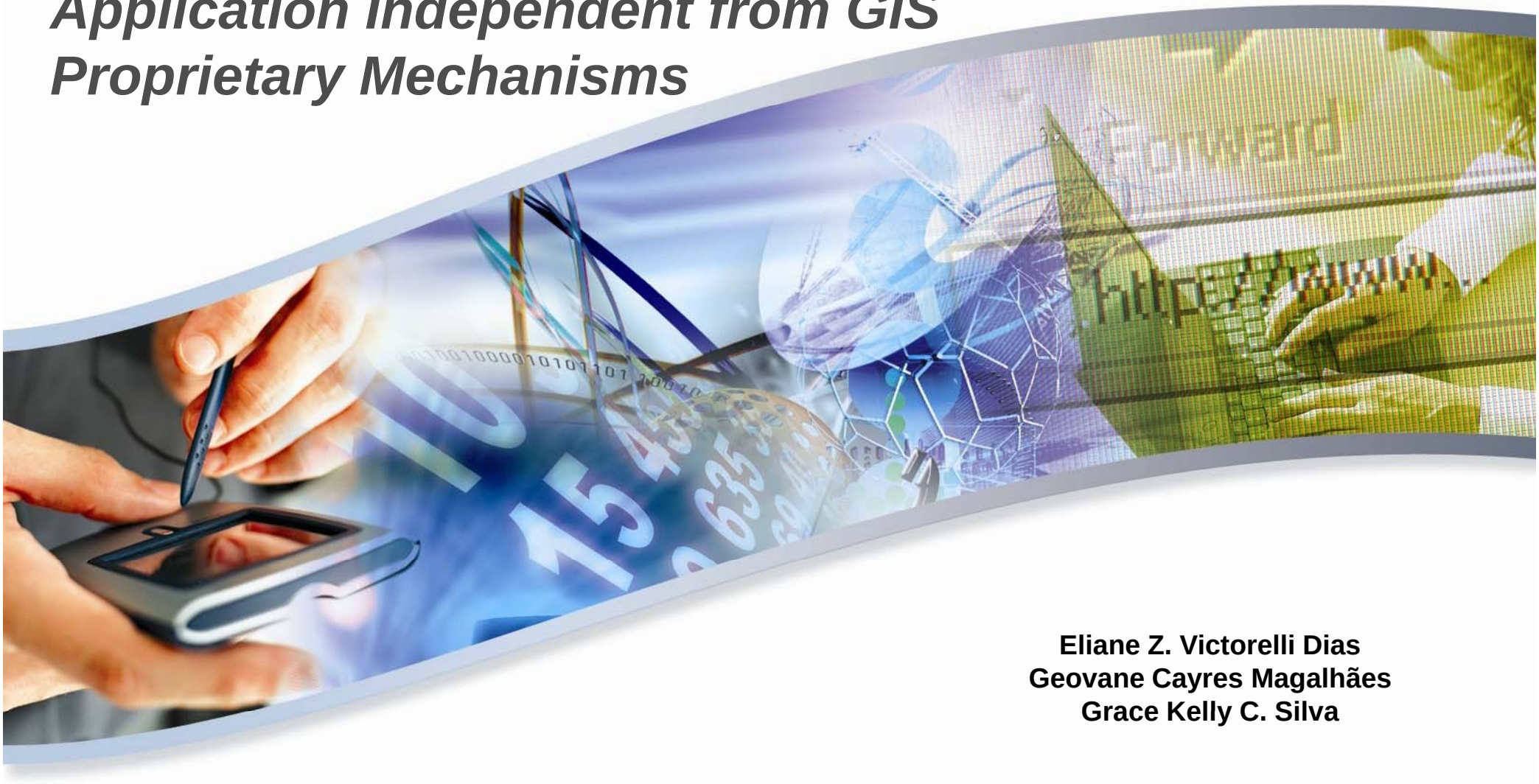
The Development of a Large Scale Geospatial Telecommunications Application Independent from GIS Proprietary Mechanisms



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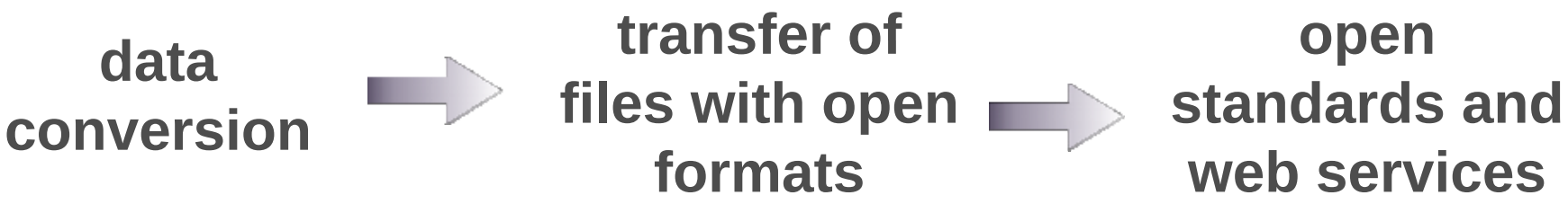
Agenda

- Introduction
- SAGRE
- CPqD OSP
- CPqD OSP Architecture
- GIS Independence from Proprietary Mechanisms
- Conclusion

Introduction

- **Geographic Information Systems developed with proprietary technology until mid 90's**
- **Evolution of system integration:**

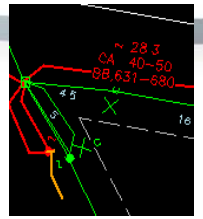


- **Goal: interoperability between systems with different platforms, databases, and programming languages**

History

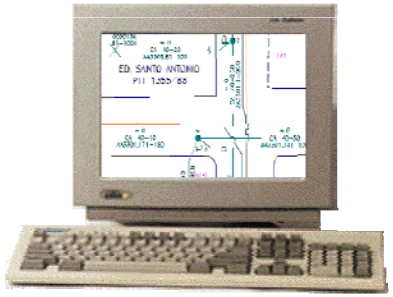
- SAGRE (Telecommunications Outside Plant Management System) was created by Telebras to manage Brazil's entire telecommunications outside network
- Regional operators had different needs: technology, topology and symbology
- Features:
  - Use of metadata to automatically build user interfaces
  - Support to long transactions
  - Multiple views of the network: design and as built

SAGRE Overview

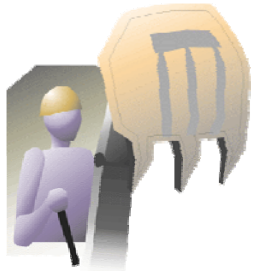


Design

Planning

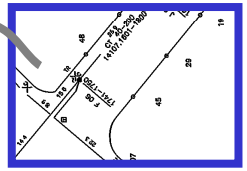


SAGRE



Construction

Operation



SAGRE: Case Telefonica Brazil

- 12 million customers
- 16 million access lines in the database
- 100 million features
- 1,300 new projects each month
- 200,000 service orders processed monthly
- 1 million spatial queries monthly
- 2 billion Oracle transactions monthly
- Telefonica received the GITA's Excellence Award 2007 for the Telecommunications Sector

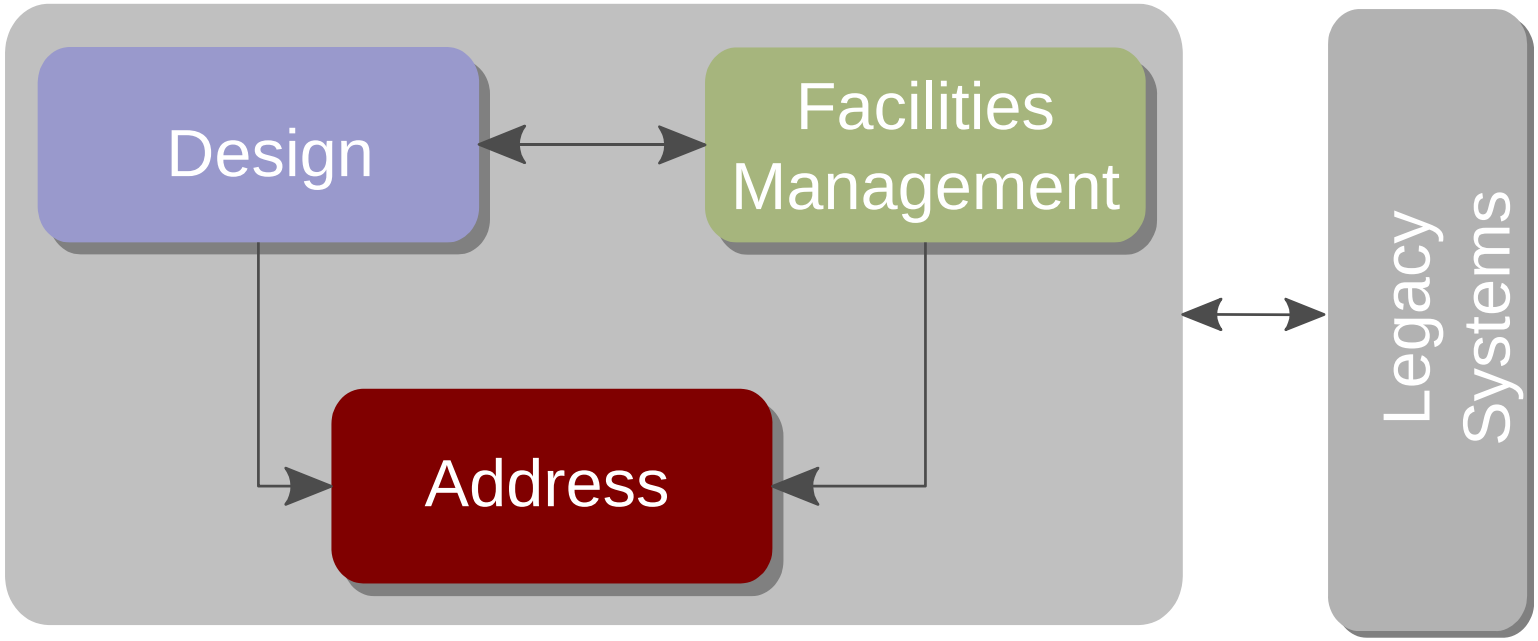
New Challenges

- **Wide variety of network technologies: wireless, copper, fiber, coaxial, hybrid fiber-coaxial (HFC)**
- **Converged Services: uniform and ubiquitous services or applications across multiple access technologies and devices**
  - **Quad Play is the first step in the converged wireless/wireline evolution: video/TV, voice, high speed data or broadband Internet and wireless**
- **Operators with different sizes: millions of customers or a few thousand**

CPqD OSP – The New Solution

- Distributed Environment
- Scalability
- High-Availability (24/7)
- Interoperability (SOA)
- Lower costs for development and maintenance
- New features can be added quickly
- Independence of the GIS platform, SGBD and application server

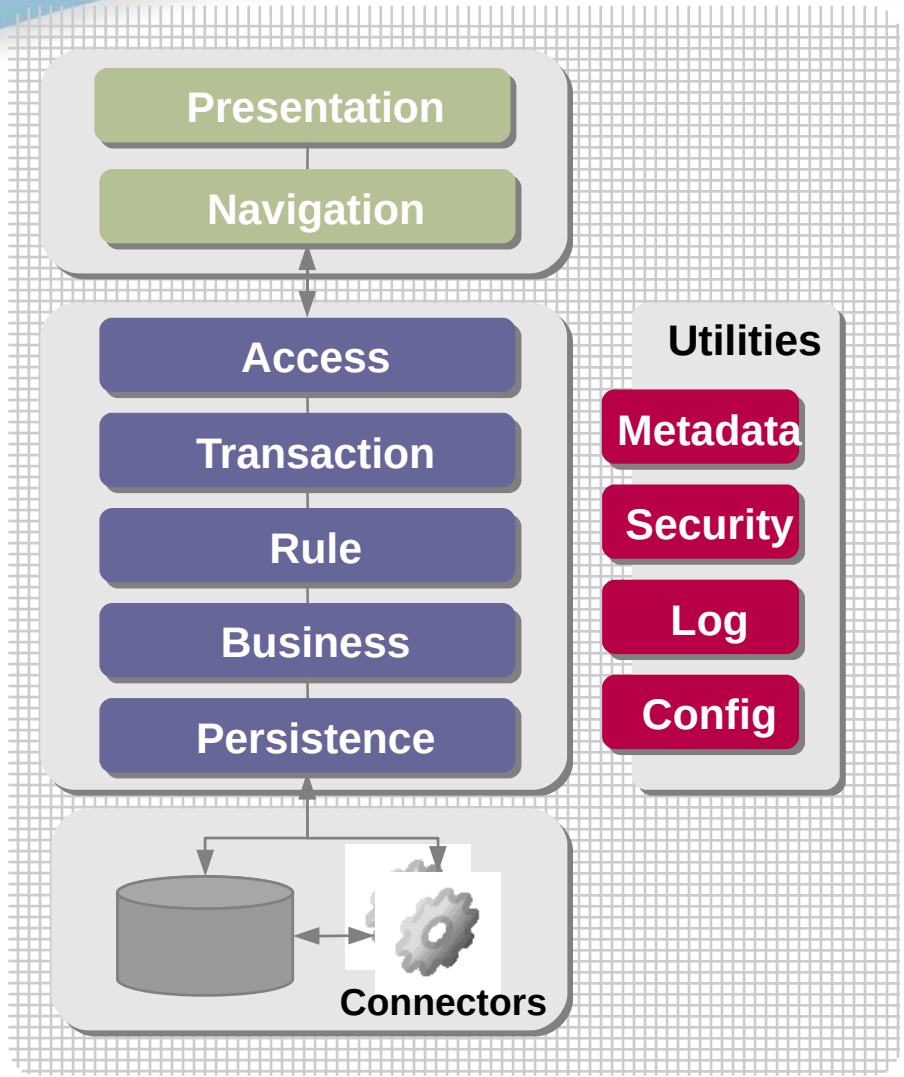
OSP Modules



OSP Modules

- Address
  - Business rules and the persistence of address objects (street address, postal code, cities, etc)
  - Geocoder: determines a geographic position, given a street address
- Design
  - Operates on top of AutoCAD Map®
  - Inventory management of existing resources with overlay of planned, future resources
  - Uses the Address component to add location to network equipments
- Facilities Management
  - Provisioning of Network resource and trouble management
  - Uses the Design component to get the network equipments
  - Uses the Address component to associate a network facility to the customer's parcel
  - Development based on NGOSS specifications

Architecture



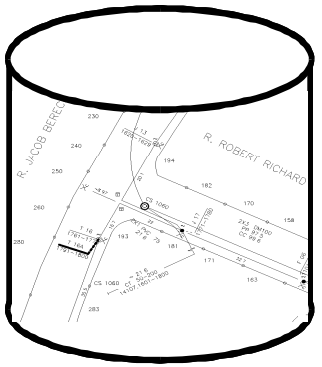
- N-Layer Architecture
- Each layer plays well-defined roles
- Based on J2EE, OGC, RBAC, JAAS standards
- Easy to scale
- Allows different types of clients

Architecture Overview

- Enterprise Datasource
  - Use an enterprise data source concept for technology independent data access.
- SOA - Service Oriented Architecture
  - The operations are deployed as services.
- GRID
  - Improve general performance of processing intensive applications by splitting and parallelizing the workload.
- MDO - Meta Data Object
  - Use metadata to describe business entities, appearance, behavior.
- Cooperative and collaborative components
  - Components can affect and collaborate with each other.
- IoC - Inversion of Control (Dependency Injection)
  - You don't create your objects, you describe how they should be created. You don't directly connect your components and services together in code, you describe which services are needed by which components, and the container is responsible for hooking it all together.

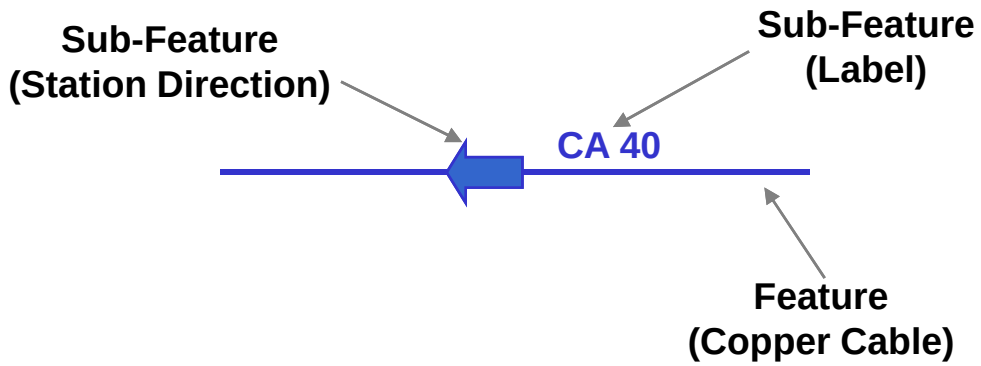
GIS Independence from Proprietary Mechanisms

- Geographic data model and persistence
- Client application
- Rendering mechanism
- Long transaction



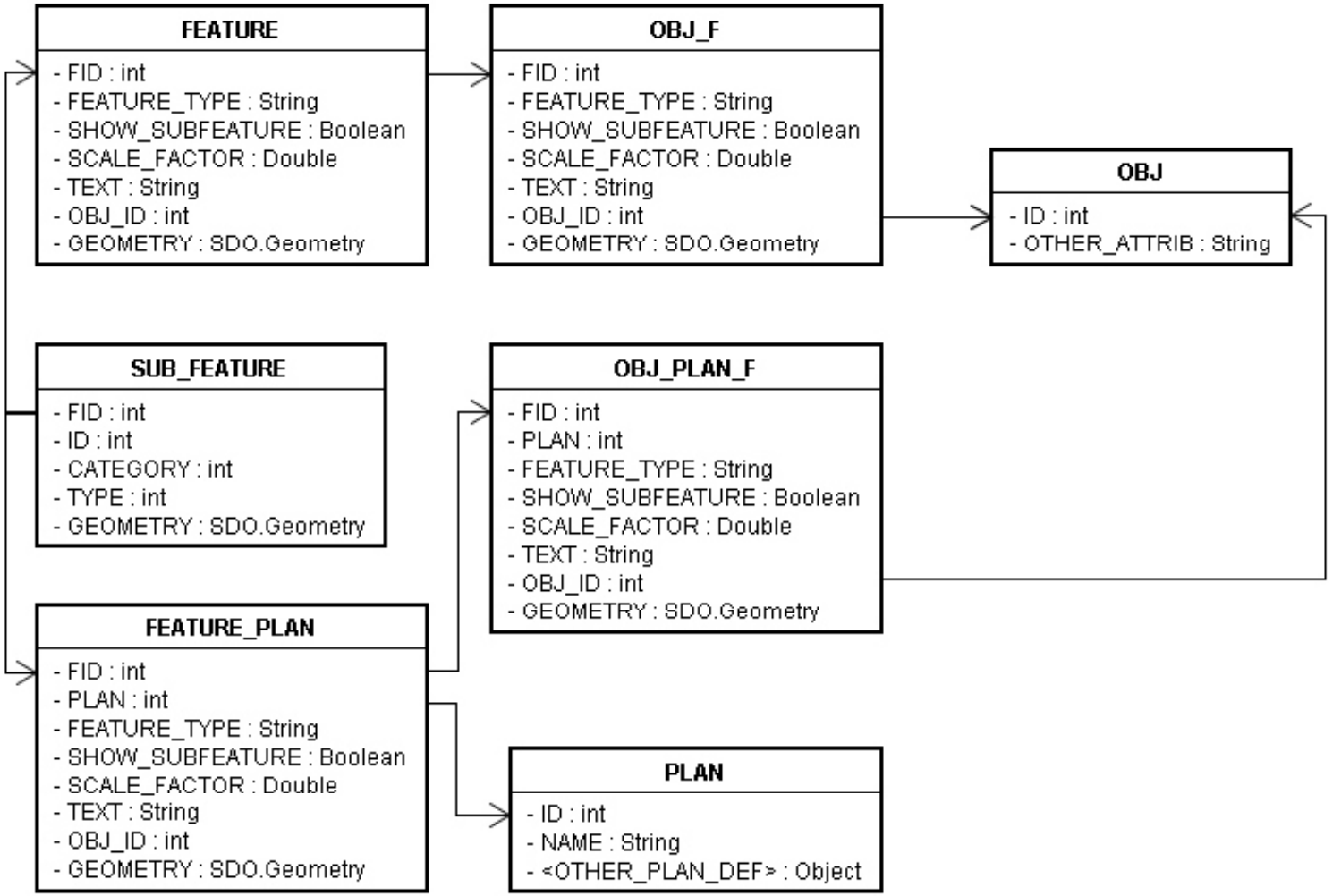
Persistence

- SpatialObject: well-defined interface to manipulate geographic data
- Use of GeoTools JTS, an implementation of OGC Feature Geometry (ISO 19107 Spatial Schema)
- Sub-feature: support to features with multiple geometries

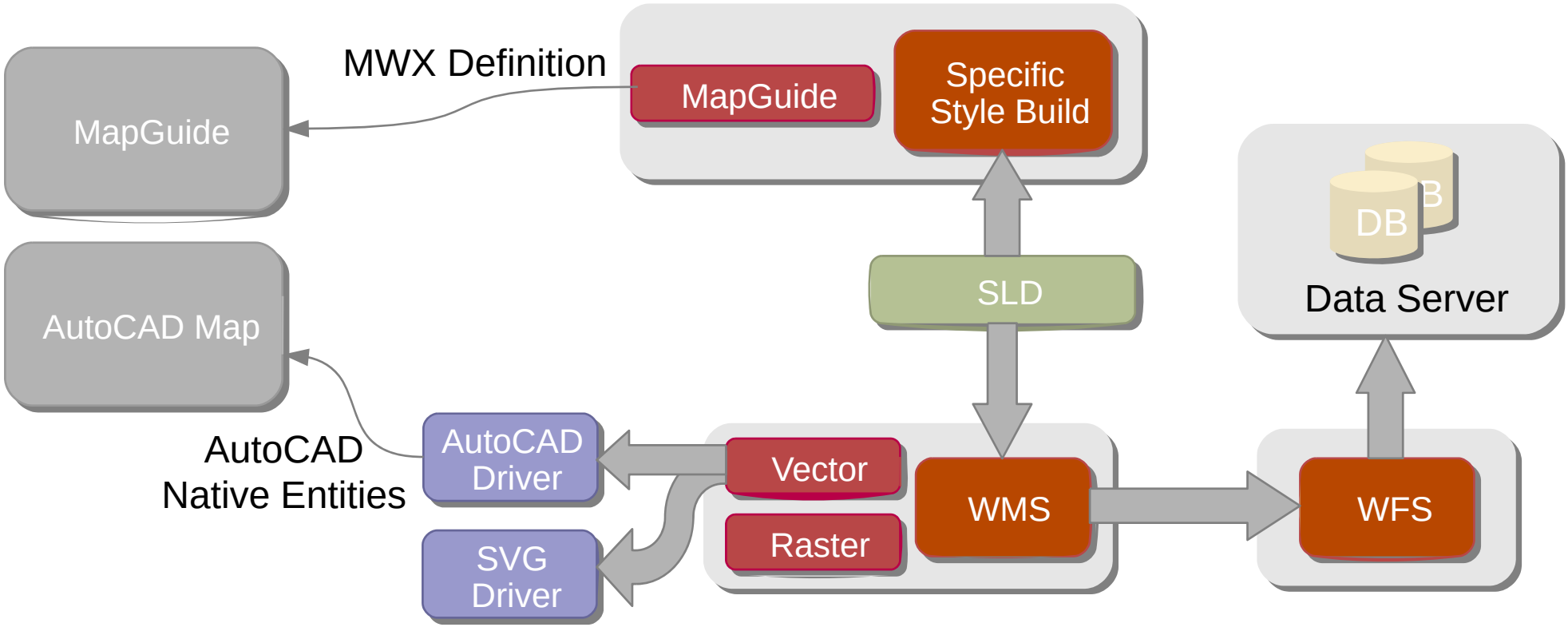


- Allows features in multiple “plans”: base map and schematics

Persistence: Database Schema



Client Application and Rendering



Long Transactions

- Mechanism based on version control
- Each object has only one version
- It is possible to view all the projects on the base map at the same time
- Versioned and non versioned objects are stored in separate tables in the database – better performance to query existing data

Conclusion

- The development of a geospatial application independent from GIS proprietary mechanisms is very challenging, but it is real
- Support to two different application servers (JBoss and Oracle Application Server)
- Support to Oracle and SQLServer
- Integrating to MapInfo and ESRI products

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Thank you!