

Open Source ERP Code Analysis



Object-oriented Enterprise Application
Programming Model for In-Memory Databases

Team: Paul Möller, Michael Wolowyk
Supervisors: Arian Treffer, Ralf Tausner,
Martin Lorenz, Jürgen Müller

The Challenge

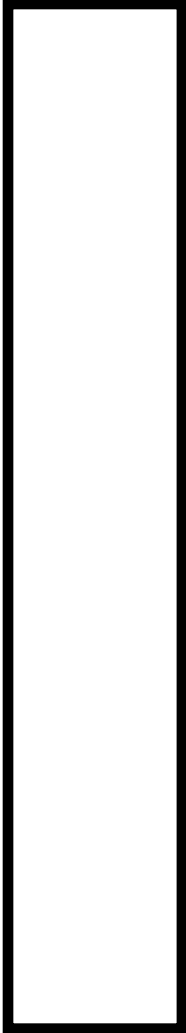
- How does **enterprise software** look like?
- Is there a common way to classify code?
 - **Automatically?**
- How much **coding effort** is spent on
 - Persistence layer
 - Application logic
 - Presentation layer
 - Configuration
 - ...
- (Back to 2-tier architecture?)

Steps

- Define **code categories**
 - adopt classification as we go
- Take two **open source ERP** systems
 - Java
 - Python
- Classify code manually
- Classify code automatically
 - Code classification
 - Code analysis
 - Code metrics
 - Architecture conformance
 - Machine learning

Code classification

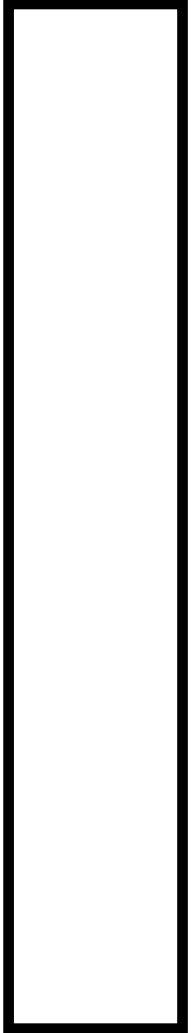
DB



Application server



Client

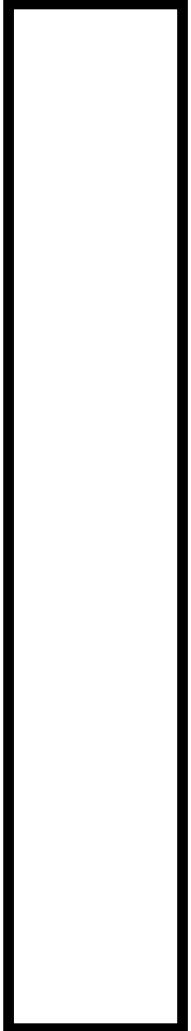
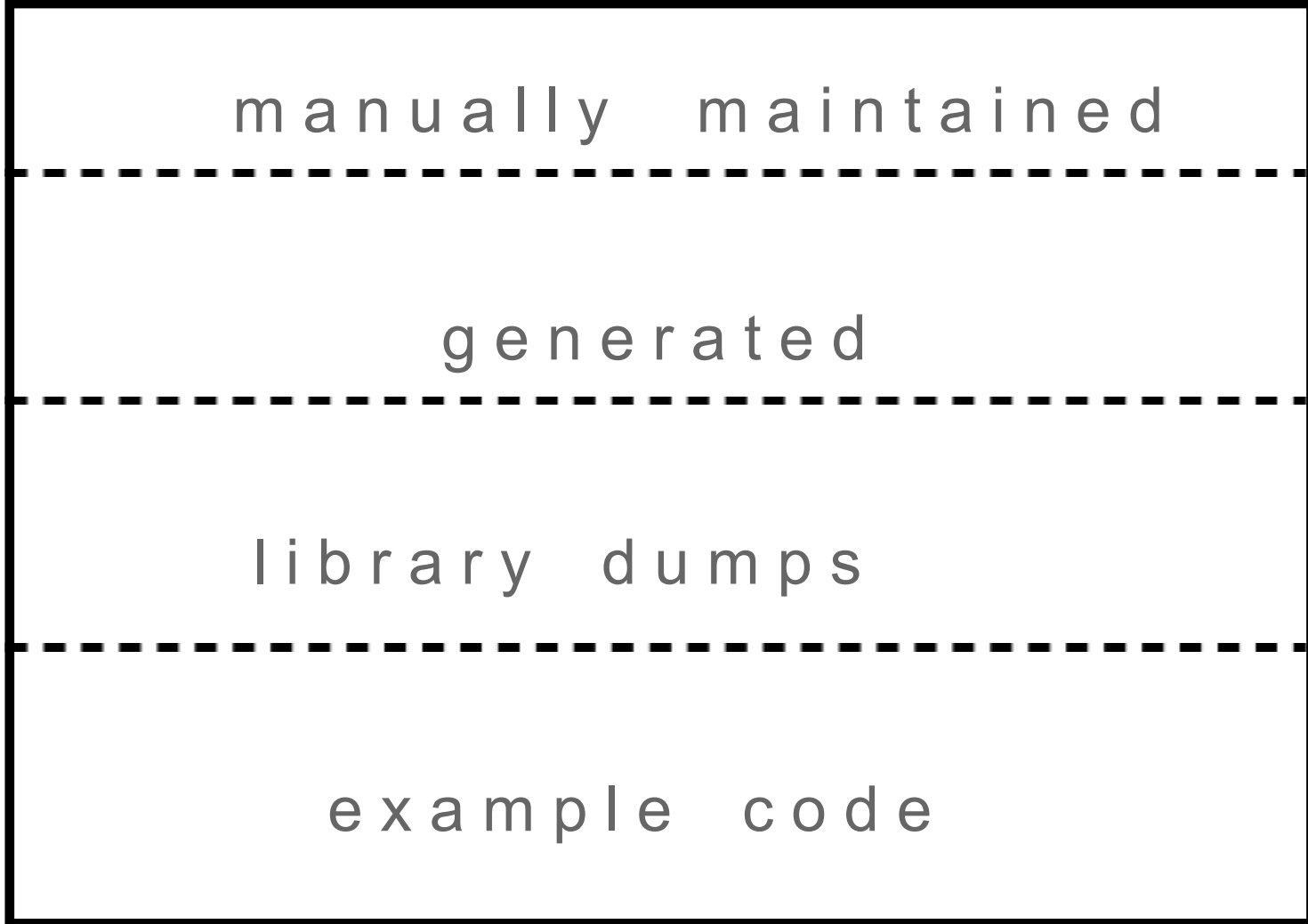
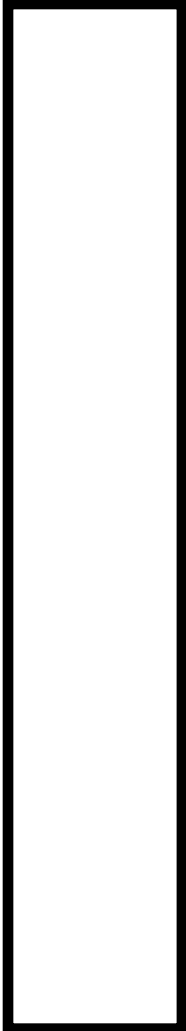


Code classification

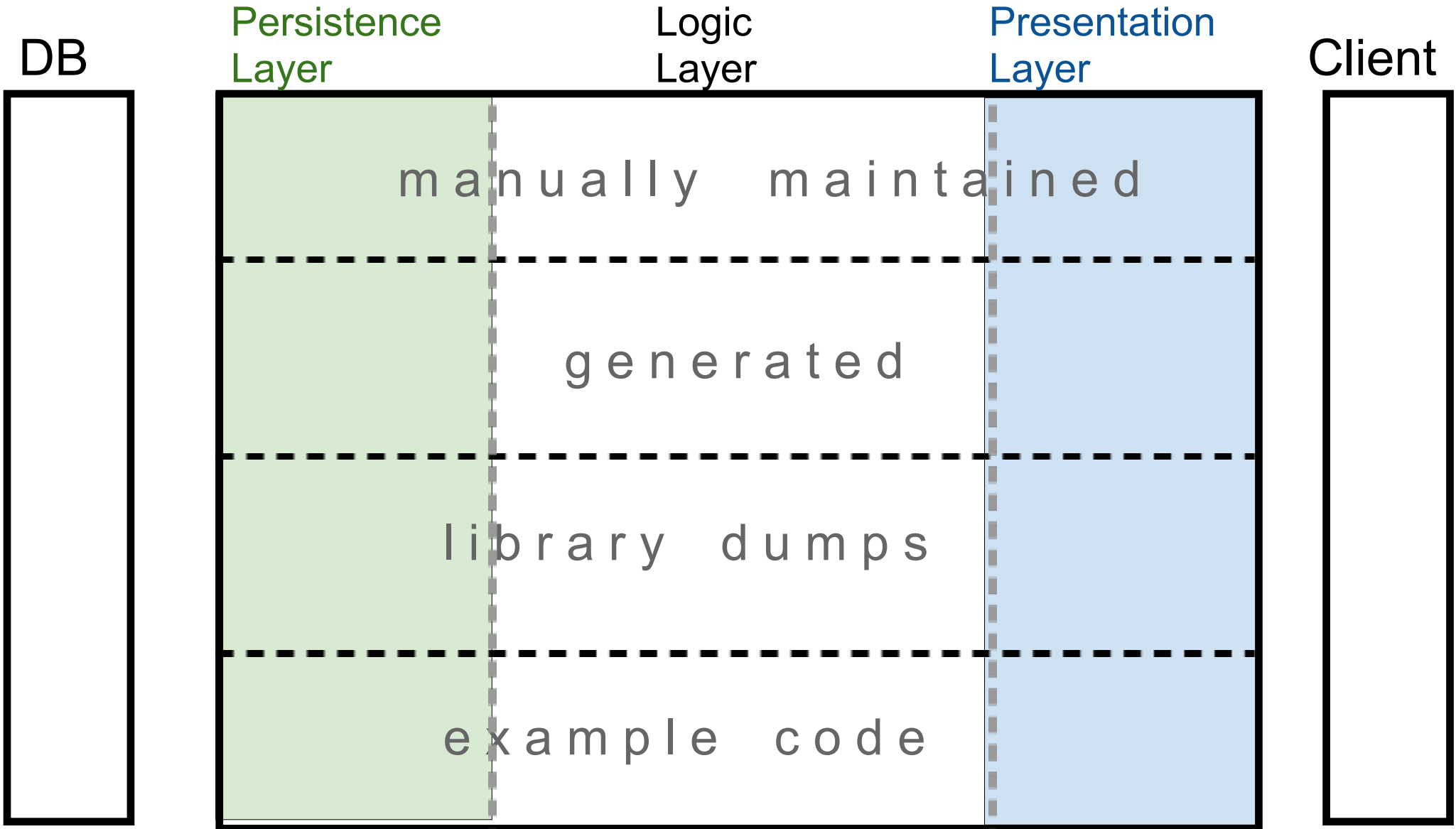
DB

Application server

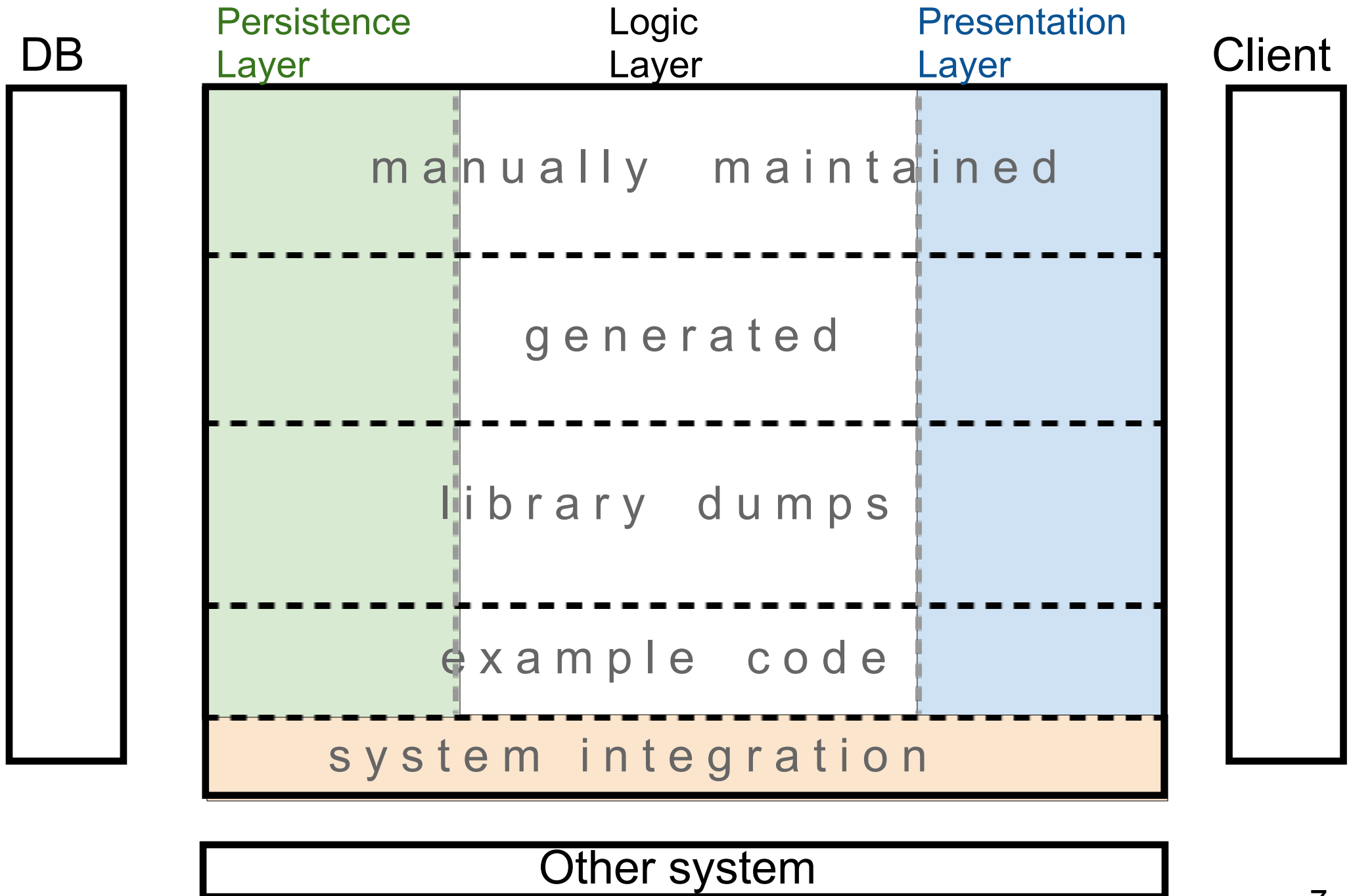
Client



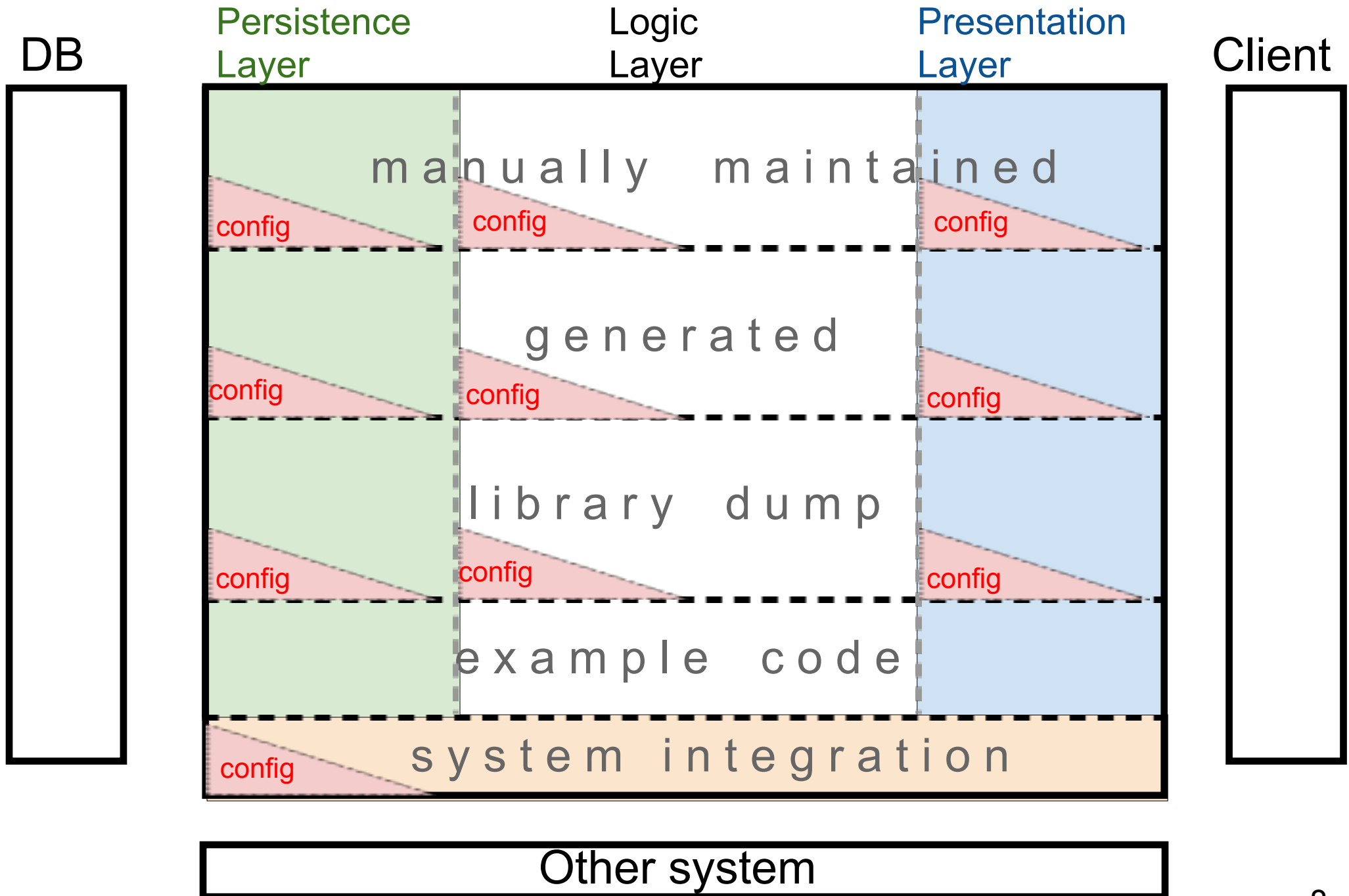
Code classification



Code classification



Code classification



Open Source ERP Systems

Compiere®

opentaps

ofbiz



WebERP



OpenERP

Tryton

openbravo[®]
opening ERP's future!

CAOFAKTURA™
Warenwirtschaftsystem

AvERP
www.averp.de

SQL
ledger®



Choose Catalog

Demo Catalog

Search Catalog

Any All

Browse Categories

- Account Activation
- DropShip Products
- Configurables Foods
- Configurables PCs
- Gift Cards
- Widgets
- Gizmos
- Services

Sign Up For Contact List

Featured Products



Enchiladas
Cheese enchiladas
ENCHILADAS
Product Aggregated Price: \$12.00



Financial Account Activation
Balance Account Activation
FA-001 Your Price: From \$1.00



Gift Card Activation
Give the perfect gift!
GC-001 Your Price: From \$1.00



Gift Card Reload
Add more money to your card!



Round Gizmo



Configurable PC
Configurable PC

Language

English (United States)

Cart Summary

Qty	Item	Subtotal
1	Service product	\$1,000.00
1	Micro Chrome Widget	\$0.00
Total:		\$900.00

Current Products

Service product

Special Offers

Special Offer: Buy 2 or more for \$150.00

KATALOGVERWAL

- | PRIMÄRANWENDUNGEN | SEKUNDÄRANWENDUNGEN |
|---------------------|-------------------------|
| AP | GESCHÄFTSANALYTIK |
| FORDERUNGEN | EBAY |
| BUCHHALTUNG | BEISPIEL |
| VERMÖGENSVERWALTUNG | ERWEITERTES BEISPIEL |
| KATALOG | GOOGLE BASE |
| INHALT | GOOGLE CHECKOUT |
| LAGER | LAGERVERWALTUNG MIT PDA |
| HR | OAGIS |
| PRODUKTION | WEB POS |
| MARKETING | WEB-WERKZEUGE |
| MY PORTAL | EBAY STORE |
| BESTELLUNG | |
| AKTEUR | |
| PROJEKT | |
| VERTRIEB | |
| AUFGABEN | |

STARTSEITE

MERKMALE

AKTIONEN

PREISREGELN

LÄDEN

THESAURUS

BEWERTUNGEN

KONFIGURATIONEN

ABONNEMENTE

LIEFERMETHODEN

WEB ANALYTICS

Katalog

Katalog

Oder:

Kategor

Oder:

Produkt

Oder:

Oder:

Produkt suchen nach Artikel-Nr.:

Neues Produkt erstellen

Schnelles Erstellen eines Virtuellen Produktes von Varianten

PRODUKT SUCHEN

Produkte suchen

STICHWÖRTER:

KATEGORIE ID:

ENTHÄLT NICHT BELIEBIG ALLE

Suchen

KATEGORIE ID:

Erweiterte Suche

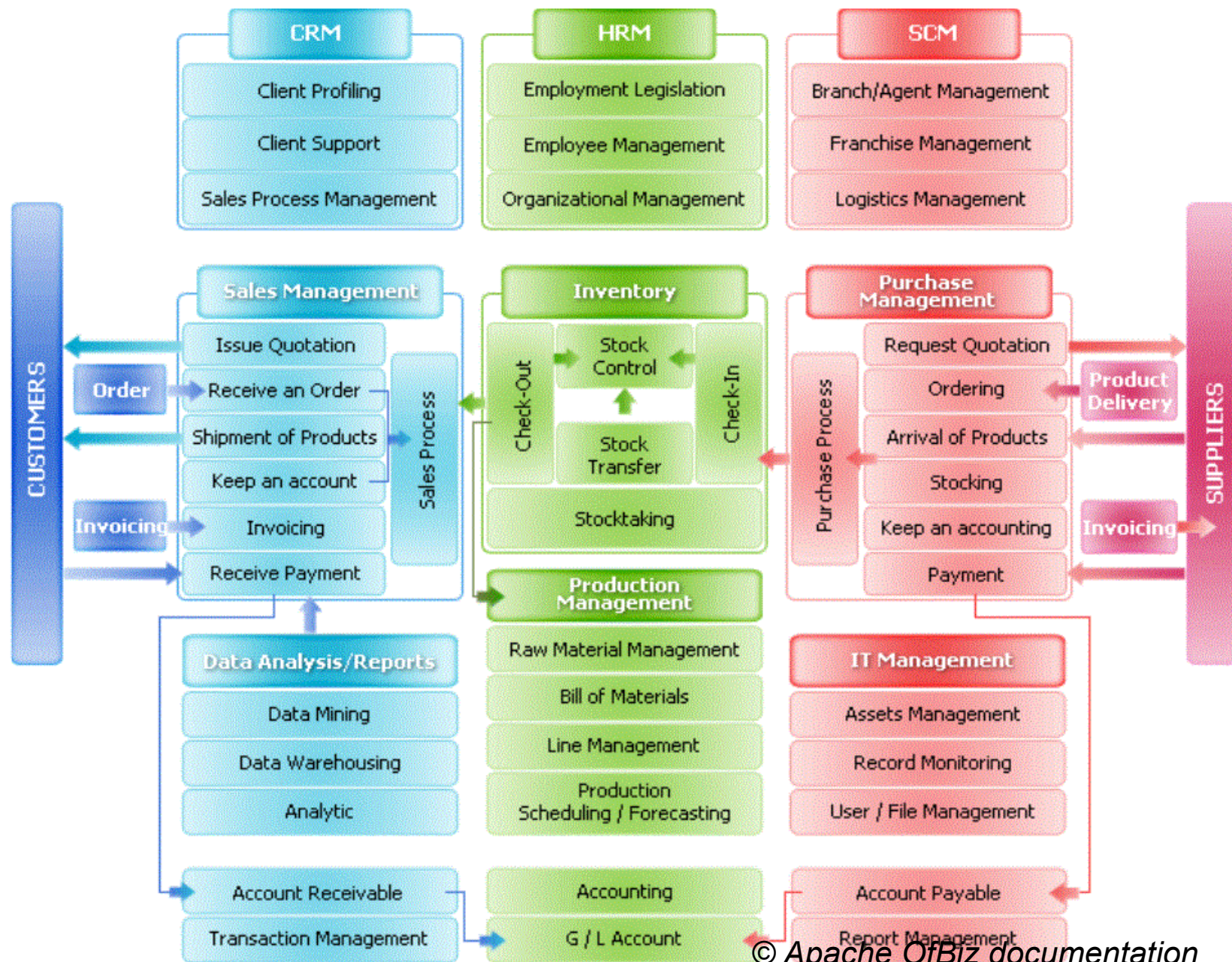
-Direktzugriff-

Kataloge anzeigen

Katalog Detailliste

- Demo Catalog
- Test Catalog
 - 100
 - Test Limited Admin Category
- Google Catalog
- eBay Catalog
- Rental Catalog

Produktgruppen durchsuchen





Basic Components:

- **Entity** - relational data construct that contains any number of Fields and can be related to other entities (application data)

```
<entity entity-name="ExampleItem" package-name="org.ofbiz.example.example" title="Example Item Entity">
  <field name="exampleId" type="id-ne"></field>
  <field name="exampleItemSeqId" type="id-ne"><description>secondary sequenced ID</description></field>
  <field name="description" type="description"></field>
  <field name="amount" type="floating-point"></field>
  <field name="amountUomId" type="id"></field>
  <prim-key field="exampleId"/>
  <prim-key field="exampleItemSeqId"/>
  <relation type="one" fk-name="EXMPLIT_UOM" title="Amount" rel-entity-name="Uom">
    <key-map field-name="amountUomId" rel-field-name="uomId"/>
  </relation>
  <relation type="one" fk-name="EXMPLIT_EXMP" rel-entity-name="Example">
    <key-map field-name="exampleId"/>
  </relation>
</entity>
```



Basic Components:

- **Service** - is a simple process that performs a specific operation
(application functionality)

```
<service name="payCredit" engine="simple" auth="false"
  location="component://webpos/script/org/ofbiz/webpos/event/PaymentEvents.xml" invoke="payCredit">
  <description>Pay Credit Card</description>
  <attribute name="amount" type="String" mode="IN" optional="false"/>
  <attribute name="refNum" type="String" mode="IN" optional="true"/>
  <attribute name="cardNum" type="String" mode="IN" optional="false"/>
  <attribute name="expMonth" type="String" mode="IN" optional="false"/>
  <attribute name="expYear" type="String" mode="IN" optional="false"/>
  <attribute name="securityCode" type="String" mode="IN" optional="true"/>
  <attribute name="postalCode" type="String" mode="IN" optional="true"/>
  <attribute name="firstName" type="String" mode="IN" optional="false"/>
  <attribute name="lastName" type="String" mode="IN" optional="false"/>
  <attribute name="track2" type="String" mode="IN" optional="true"/>
</service>
```



DB

Persistence Layer

Logic Layer

Presentation Layer

Client

- XML Data Modeling
- ORM
- Database independence
- Meta-programming

- SOA
- Web Services
- Scripting Languages
- Meta-programming

- MVC
- Decorator pattern
- Templates vs actions
- Meta-programming
- Widgets

config

- entitygroup*.xml
- entitymodel*.xml
- ...

config

- services*.xml
- servicegroups*.xml
- ...

config

- Screen.xml
- Forms.xml
- ...

FRAMEWORKS

Next Steps

- Define code categories
 - adopt classification as we go
- Take two open source ERP systems
 - Java
 - Python
- Classify code manually
- Classify code **automatically**
 - Code classification
 - Code analysis, Code metrics
 - Architecture conformance
 - Machine learning, SVMs
- Compare results to improve classifiers