Worldwide

Developers

Conference

Data Access in WebObjects

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Manager, Web/Enterprise Technology

Overview

- What is EOF?
- How is it different?
- Architectural Overview
- Demo
- Third-party opportunities
- Q&A

Enterprise Objects Framework

- Object-oriented middle-ware for building database applications
- Integrated solution for data access for WebObjects and AppKit applications
- Powerful collection of generic object management facilities

Features

- Database independent
- Transparently maps custom business objects to relational tables
- Binds business objects to user interfaces
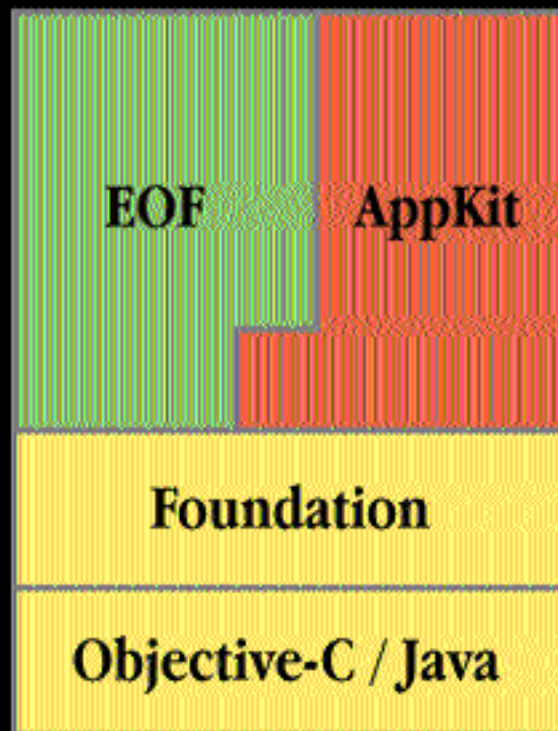- Completely open and extensible
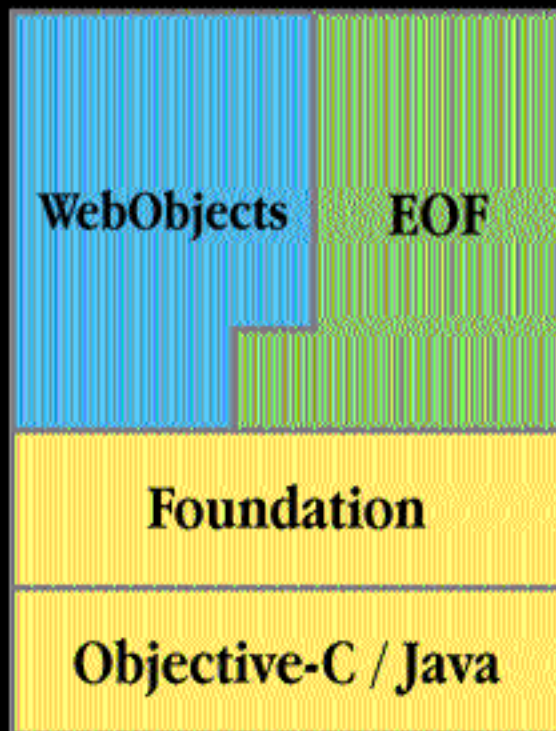
How Is It Packaged?

- As a set of frameworks, adaptors, and developer tools
- Bundled with the ADP and WebObjects
- Adaptors for access to enterprise databases packaged separately

How Does It Fit In?

How Does It Fit In?

WebObjects | EOF

Foundation

Objective-C / Java

NeXT's Experience

- **Company Focus: Provide tools for the rapid development of Mission Critical Custom Applications**
- **1st Generation: DBKit**
- **2nd Generation: EOF 1.0, 1.1**
- **3rd Generation: EOF 2.0, 2.1**

Modern Business Applications…

- Embody the rules of the business
- Access heterogeneous corporate data
- Offer front ends the users want (Mac, Windows, Web)
- Provide reusability, maintainability, scalability, and reliability
- Support new front ends and back ends without breaking

The Key Question:

Where to put the Logic?

RDBMS

The 4GL Approach — In the UI

The 4GL Approach — In the UI

* Not maintainable
* Limited reuse
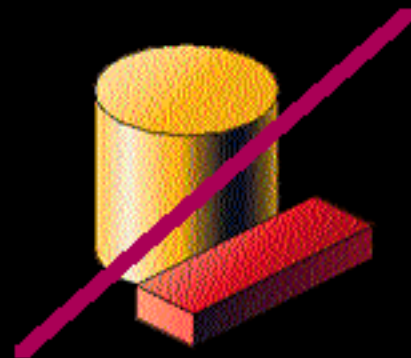* Poor scalability
* Poor integrity

Database-Centric Approach —
Stored Procedures
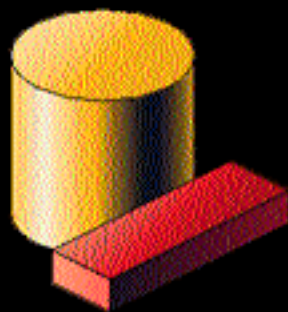
Database-Centric Approach
Stored Procedures

- SQL poor development language
- Limited interactivity
- No back-end portability
- Inflexible access

The Solution: Business Objects

Solution: Business Objects

Solution: Business Objects

- Encapsulation
- Reuse
- Flexibility
- Natural modeling of real world

Business Objects?

- **Finance**
  - Customers
  - Portfolios
  - Invoices
- **Media**
  - Scene
  - Clip
  - Actor

Example: Business Logic

```java
class Course extends Object {
    String name;
    Vector grades;

    public void boostGrades() {
        int i, count = grades.size();
        for(i=0; i<count; i++) {
            Grade g = grades.elementAt(i);
            g.setScore( g.getScore()*1.10);
        }
    }
```

Example: Business Logic

```
void validateForSave {

    if (this.averageGPA() > 3.7)

        throw new ValidationException(this,
        "Grade inflation is out of
        control!");

}
```

Using Business Objects

```
{
    Course course;   // assume exists
    Student student;   // assume exists

    course.boostGrades();
    student.setPhone("555-1234");
    context.saveChanges();
}
```
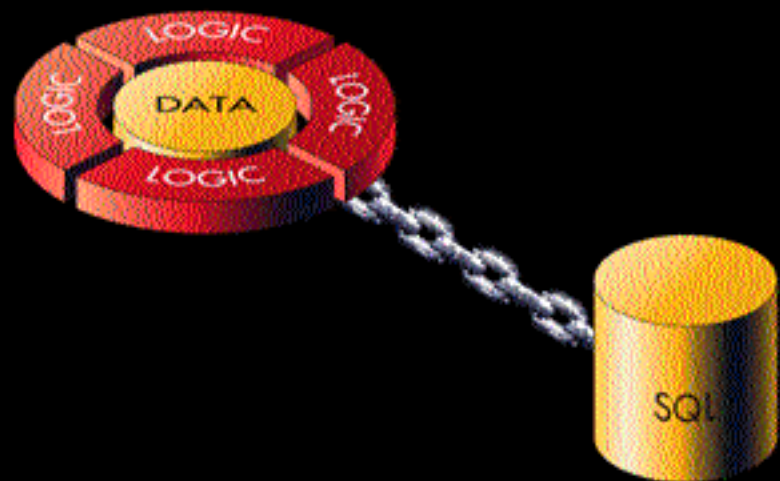
Building User Interfaces

Building User Interfaces

Accessing the Database
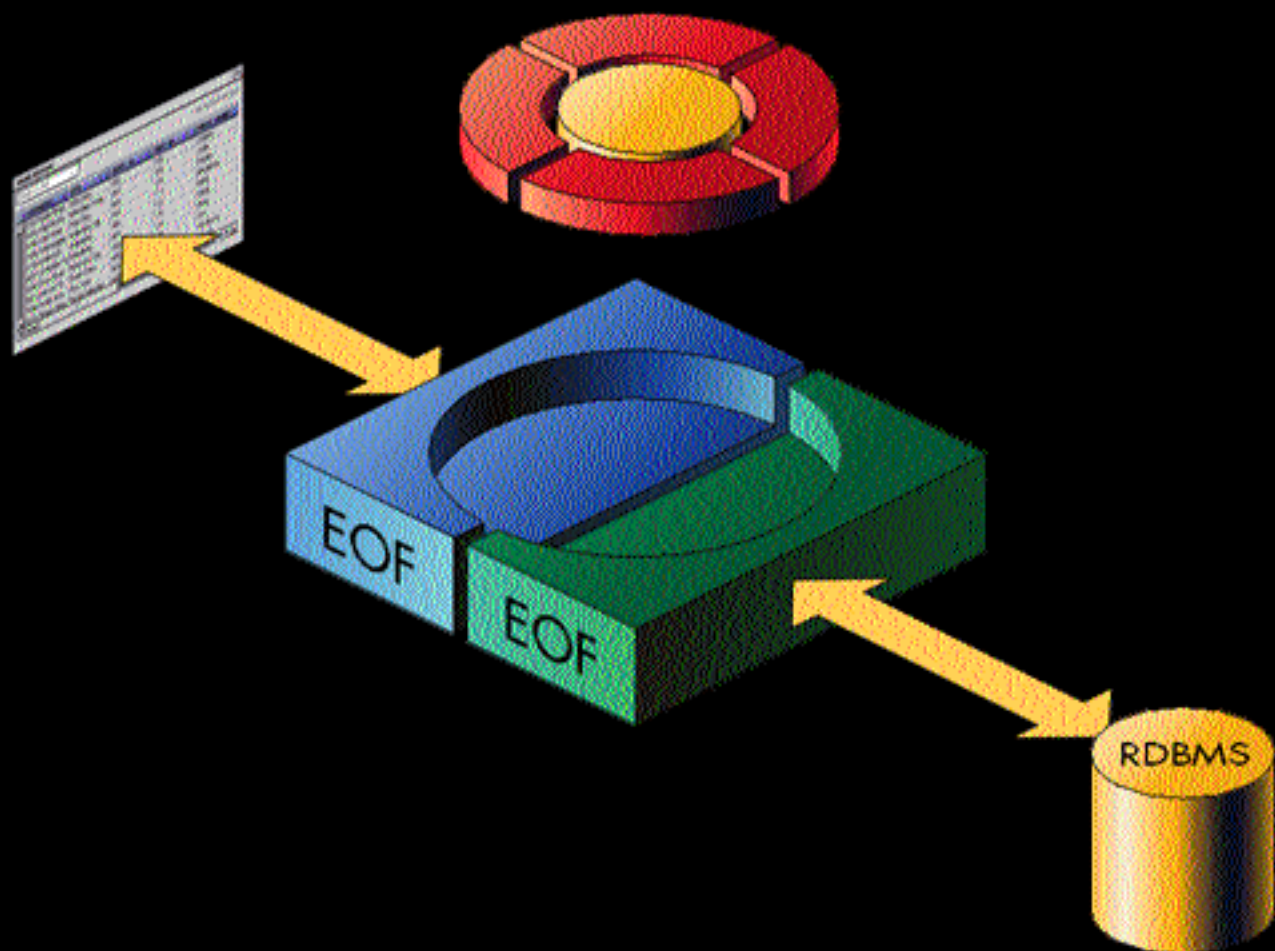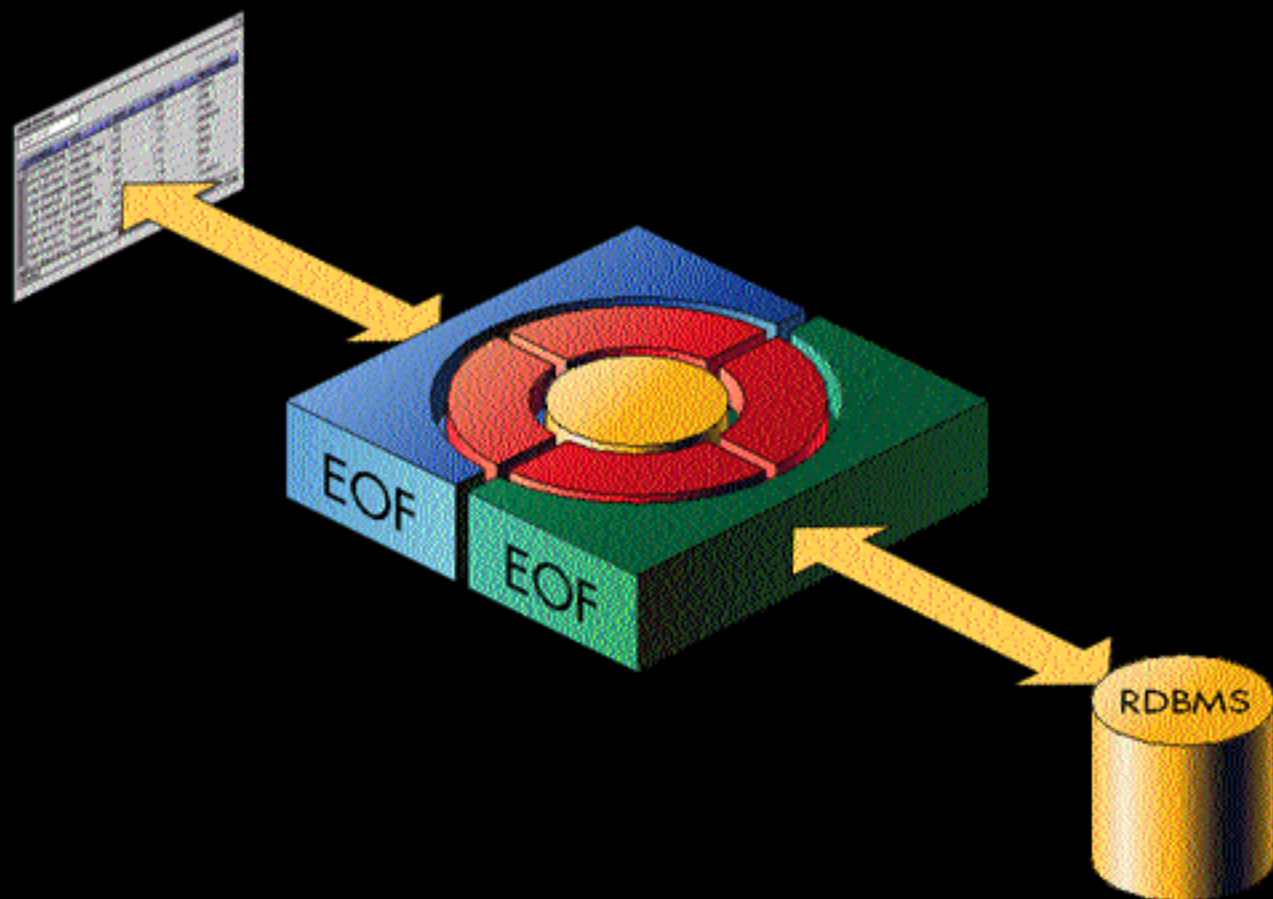
Accessing the Database

Result: Inflexible Objects
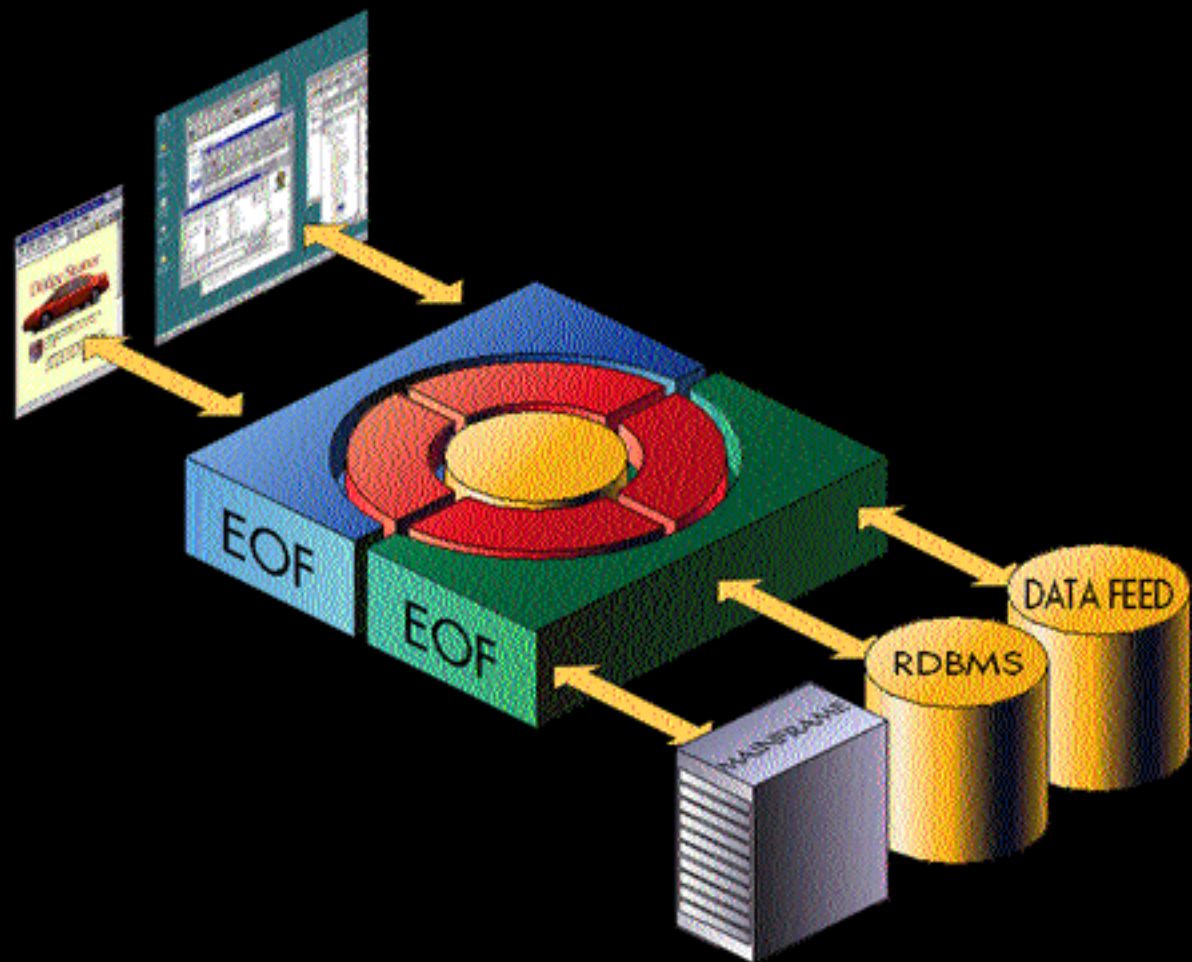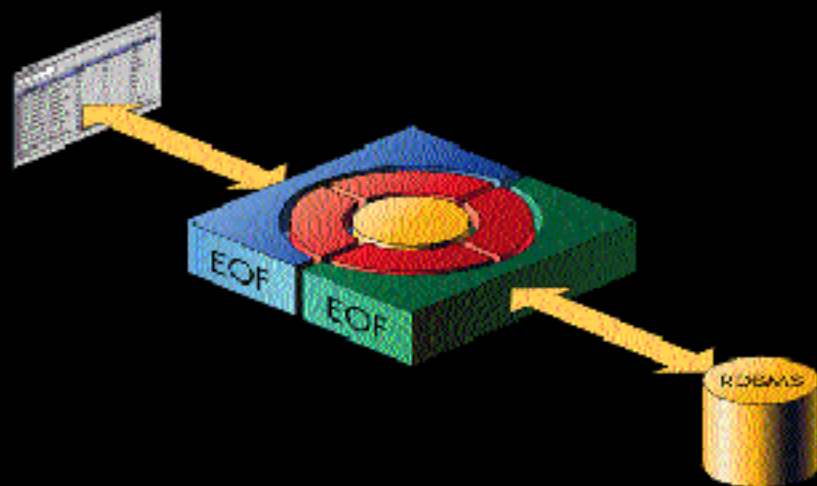
The EOF Approach

The EOF Approach

The EOF Approach

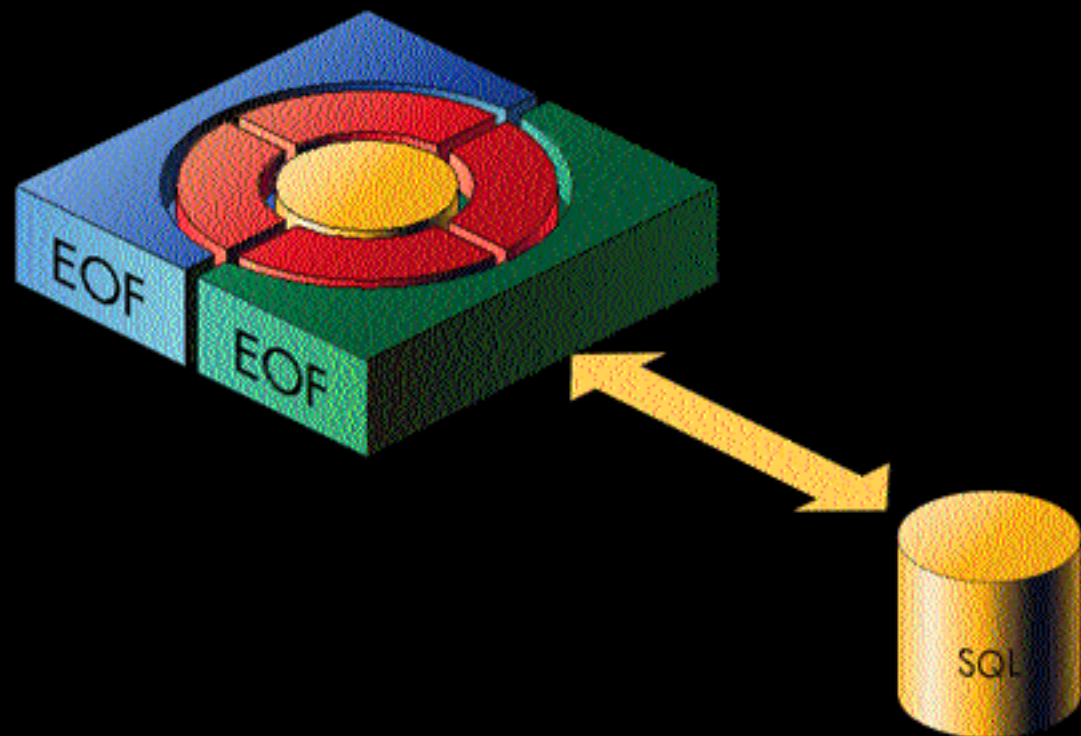# Any UI, Any Data Source

EOF: Pure Objects

Objects don't know SQL

Objects don't know UI

Objects don't know Location

Object to Relational Mapping

Classes Mapped to Tables

Employee Table			
EmpNo	Name	Title	Mgr
36	Jill	Manager	

Department Table		
DeptNo	Name	FacNo
101	Engineering	2

Project Table		
ProjID	Name	Mgr
1	EOF	36

Classes Mapped across Tables

Employee Table			
EmpNo	Name	Title	Mgr
36	Jill	Manager	

Address Table		
EmpNo	Street	Zip
36	800 Maple	90210

Database Key to Object Pointer
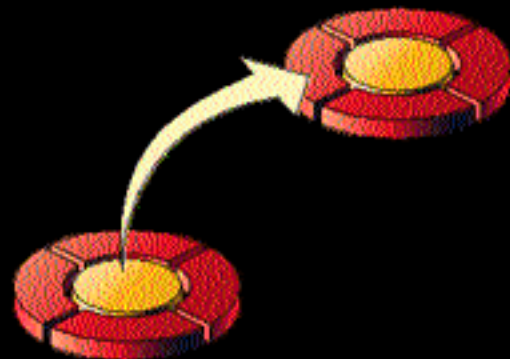
Employee Table			
EmpNo	Name	Title	Mgr
36	Jill	Manager	
304	Bob	Engineer	36

Inheritance Mapping

Person

Customer   Employee

Person Table		
ID	Name	Address
36	Jill	90210
37	Fred	94040

Employee Table			
ID	Title	Mgr	Dept
36	Manager	1	101

Customer Table		
ID	Region	SalesRep
37	Pacific	203

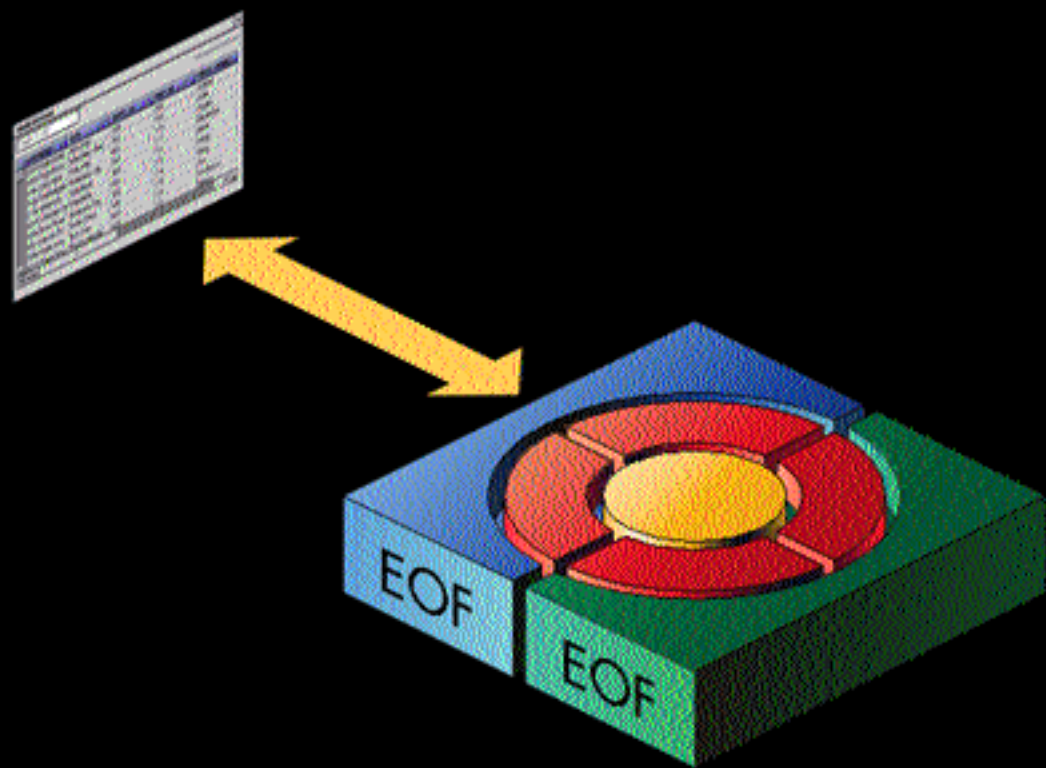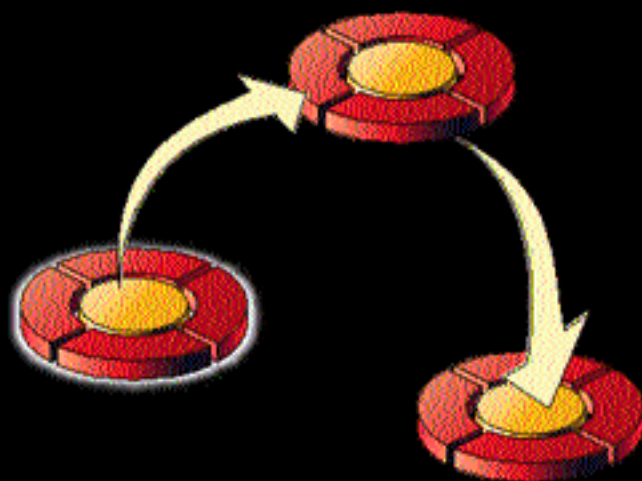# Other Essentials

- Custom datatype mapping
  - (e.g., BLOB to image class)
- Referential Integrity
- Transparent object "faulting"
- Object caching
- Automatic primary and foreign key generation

Object to UI Mapping

Automatic UI Synchronization

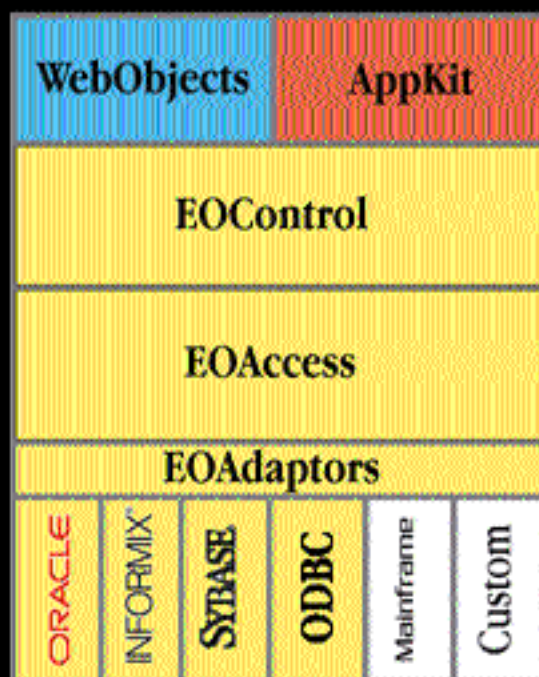# Architectural Overview

Frameworks

AppKit
EOInterface
EOControl
EOAccess
EOAdaptor

Data Flow

Layer
AppKit
EOInterface
EOControl
EOAccess
EOAdaptor

Application Components

AppKit

EOInterface

EOControl

EOAccess

EOAdaptor

.nib

.java

.eomodel

Tools

AppKit	
EOInterface	
EOControl	
EOAccess	
EOAdaptor	

.nib   InterfaceBuilder

.java   ProjectBuilder

.eomodel   EOModeler

Frameworks

Data Flow
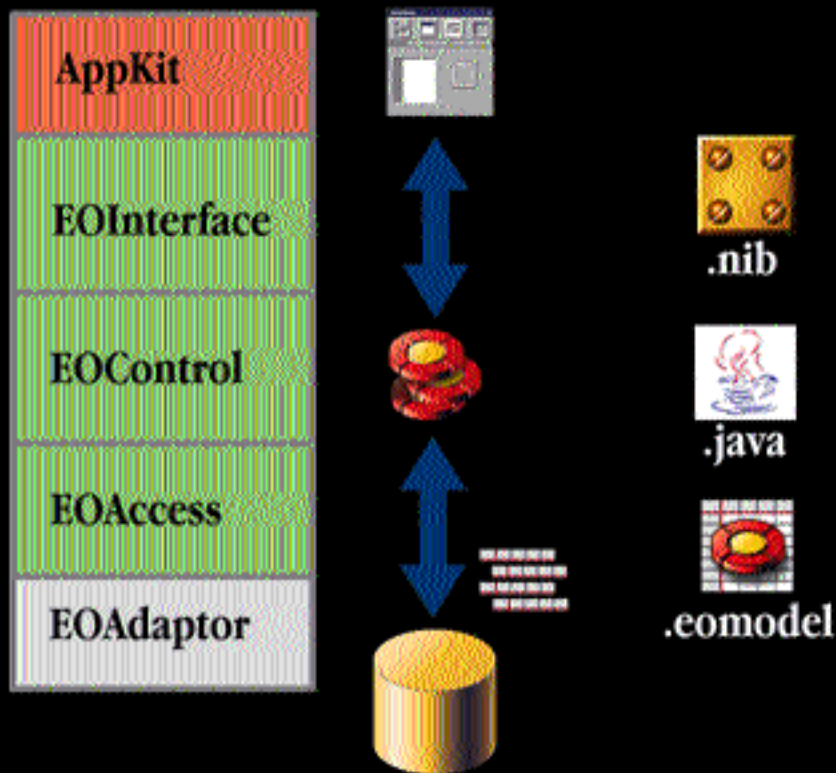
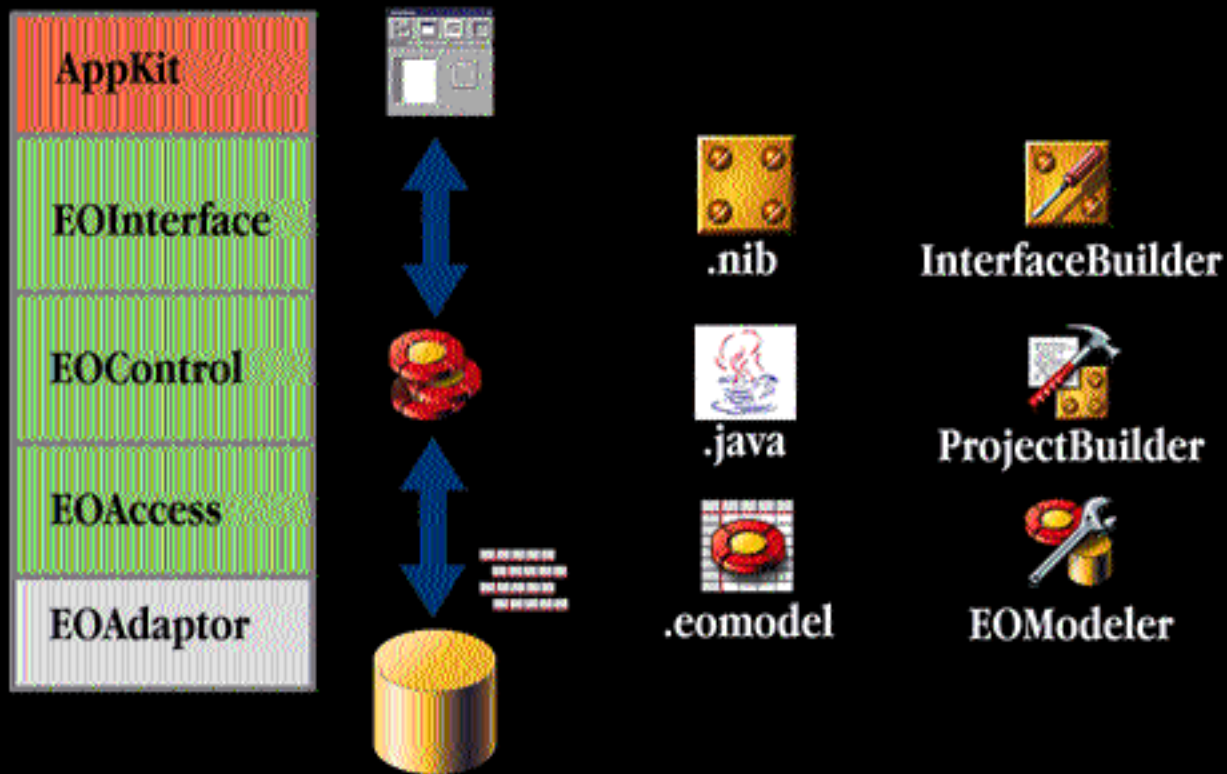| Browser |
|---|
| WebObjects |
| EOControl |
| EOAccess |
| EOAdaptor |
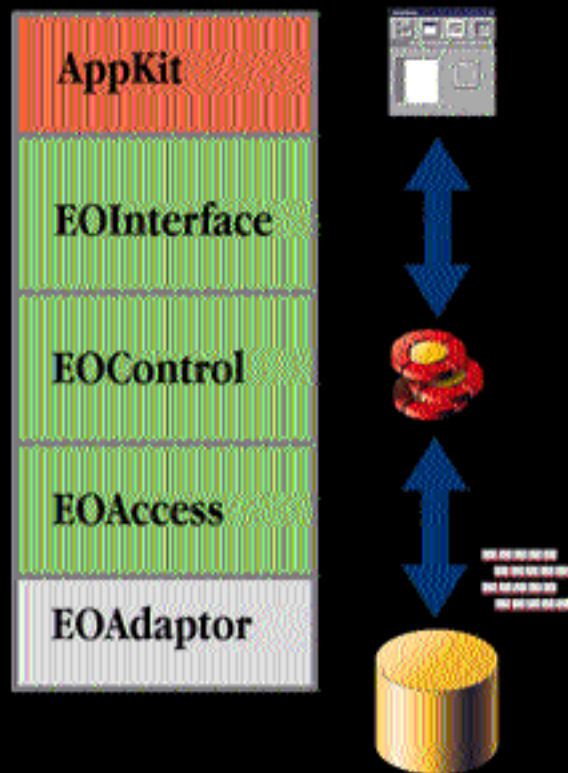
Application Components

Tools

Browser

WebObjects

EOControl

EOAccess

EOAdaptor

.wo — WebObjectsBuilder

.java — ProjectBuilder

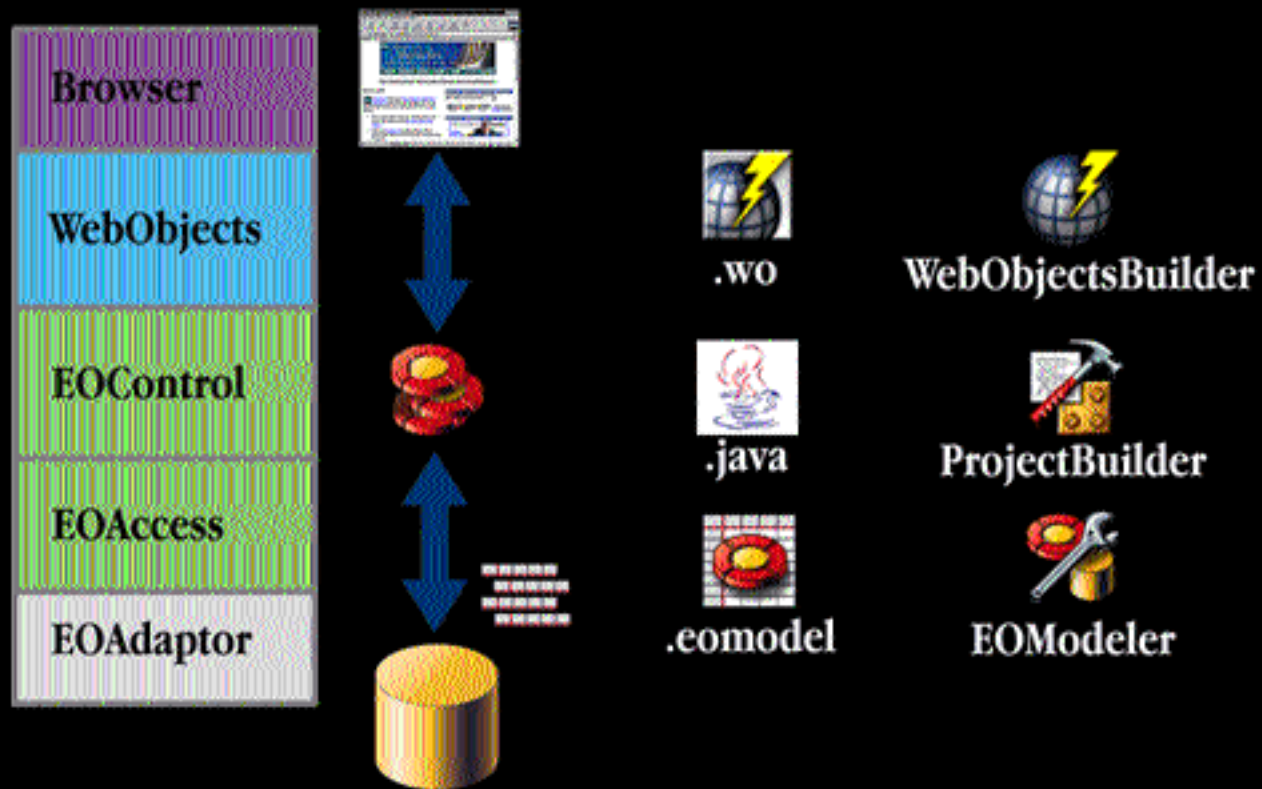.eomodel — EOModeler

Demo

Third-Party Opportunities

- **Vertical Applications**
  - Media production, health care, education, finance, HR
- **Adaptors to other data sources**
  - Mainframe (3270, CICS)
  - Application-specific formats (organizers, spreadsheets)
- **Tool integration**
  - OOA&D tools can export to EOF Model Formats

Q&A

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