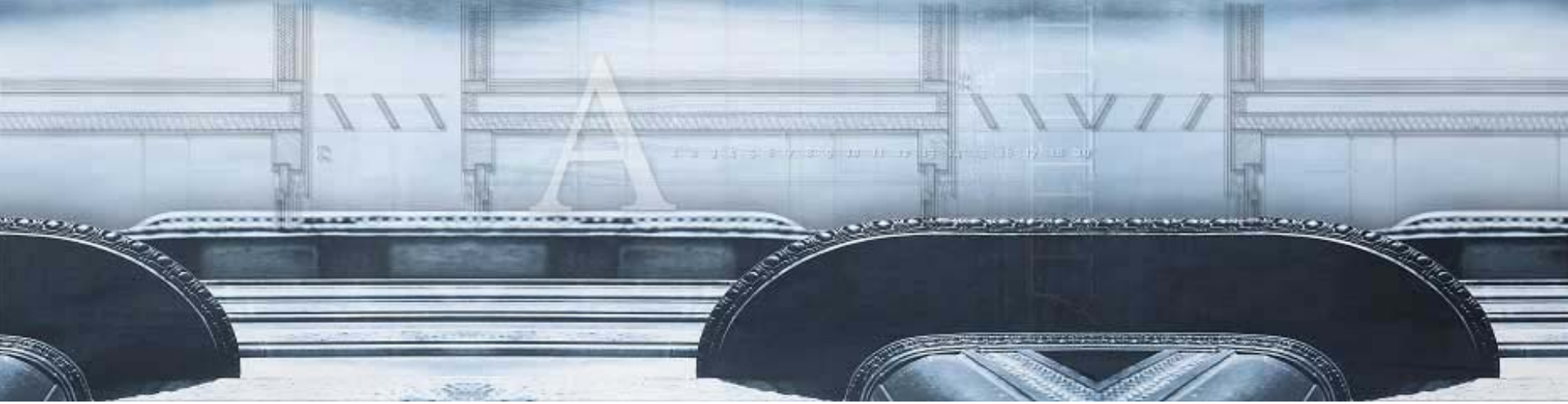


THE IT-ARCHITECTURE PROFESSIONALS

Case study at Deutsche Bank AG – illustrating concepts, application and ROI of Convergent Architecture with MDA

Jens-Hagen Syrbe

Interactive Objects

Outline

- Introduction
  - Deutsche Bank Bauspar and the b-online project
- MDA @ work
  - Convergent Architecture
  - Applied MDA
  - Software Development Process
- Conclusion
  - MDA Benefits

Deutsche Bank Bauspar

- Industry: Financial
- URL: www.deutsche-bank-bauspar.de
- Company facts:
  - Founded 1987
  - Subsidary of Deutsche Bank AG, the leading German bank
  - Provides special savings plans within the framework of savings and loan associations, designed to help its customers build the capital to acquire real estate
  - Approx. 800,000 customers

b-online: Project Overview

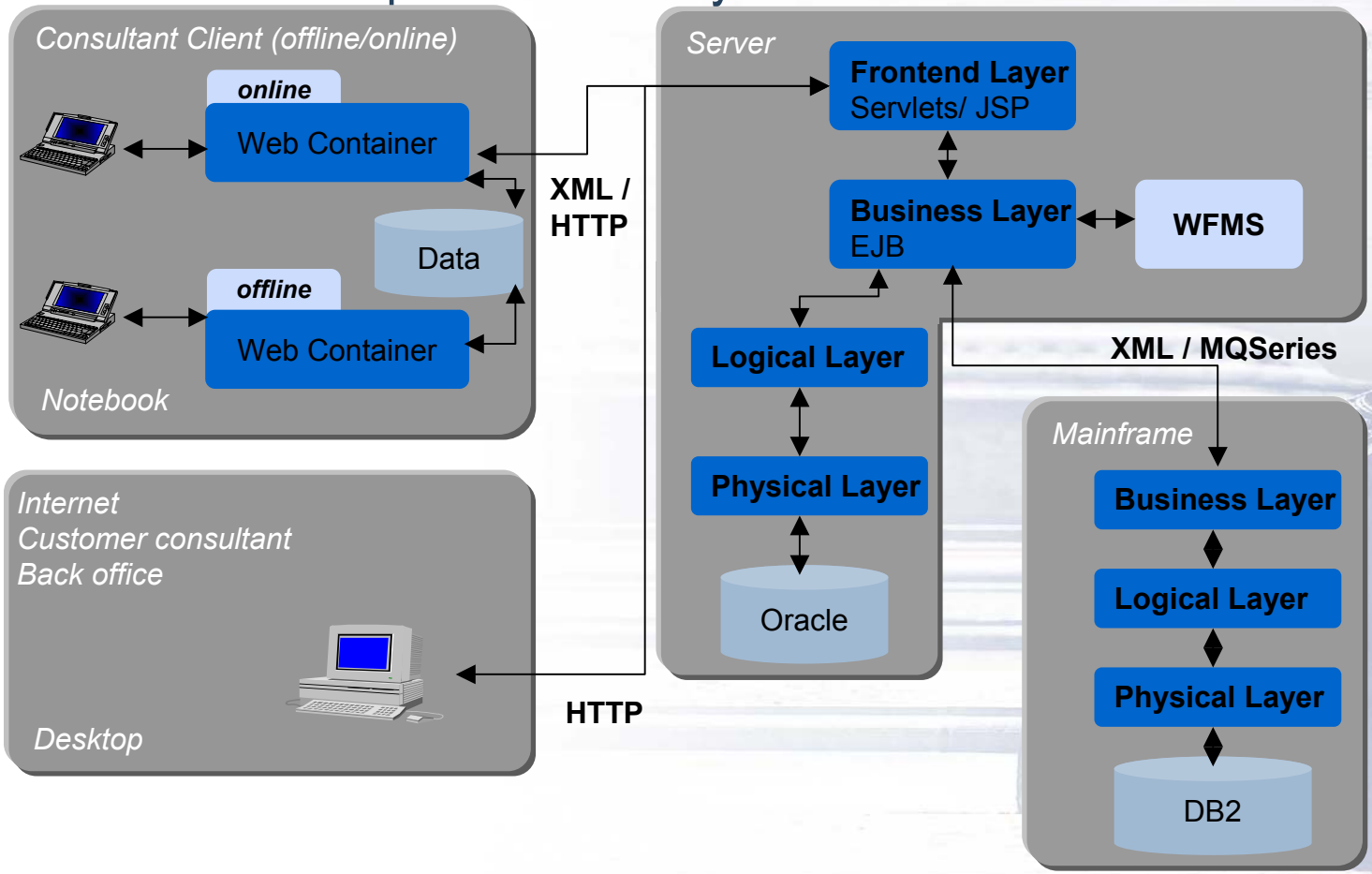
- Project: b-online
  - Internet-enabling and integrated support of core business processes of Customer Service
- Concerns
  - Increasing demands and requirements of the users
  - New technologies emerge at an ever increasing rate
  - No standard software solution available
- Legacy Migration/Integration
  - Reuse: Existing mainframe system
    - Based on CICS, COBOL, DB2
    - Implemented in 80‘s and continuous development ever since
    - Business logic to be extended, technological basis essentially unmodified
  - New: Web-based front ends
    - Large-scale Internet application
    - Several intranet and internet front ends to be integrated with mainframe system

System Users

- Customers
  - View contracts, download forms, apply via internet
  - Customer activities have to be verified by staff prior to any modification of data
- Sales partners/field staff
  - Comprehensive calculation and status information on contracts and customers
  - Customer service application used on-line and off-line
- Back office staff
  - Finalize processes without re-entering redundant data

b-online System: N-Tiered Architecture

- Core Requirements
  - Integration of existing system
  - Openness to different presentation layers



Model Driven Architecture (MDA) (1)

- Thorough evaluation showed MDA to be optimal solution:
- Evolutionary development
  - MDA explicitly supports diverse technologies and heterogeneous IT landscapes as found at Deutsche Bank
  - Future-oriented, step-by-step modifications
- Independence of implementation technologies
  - MDA and appropriate tools allow decoupling of business logic from technological detail
  - Flexibility to quickly respond to new and changing technologies
  - Flexibility to quickly respond to new and changing business requirements

Model Driven Architecture (MDA) (2)

- High development productivity and system quality
  - Focus on business logic
  - Integration of heterogeneous environments automated by infrastructure generation from common model, automated consistency and quality assurance
- Excellent communication and collaboration in dev process
  - MDA and appropriate tools improve collaboration between different roles (Business analysts, OO developers, COBOL developers)
  - Common UML model and well-defined modeling style as lingua franca and easy-to-understand documentation

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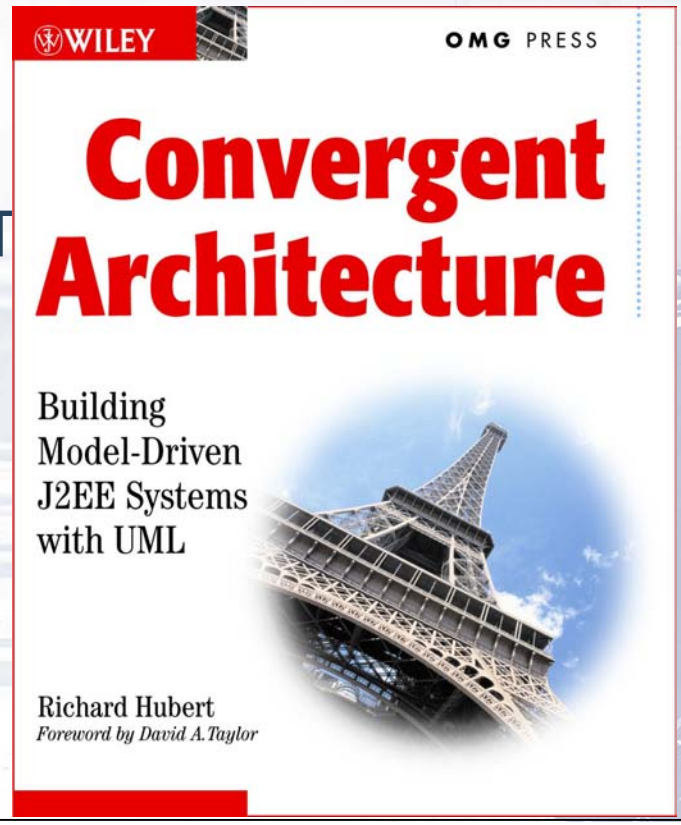
Convergent Architecture

- Holistic, model-centric approach to IT Architecture
- One single model for business experts and IT experts
  - Model/repository allows different views, revealing information on different levels of abstraction
    - Traceability, no information loss
    - Separation of concerns: Business and IT
- Explains and applies OMG's MDA
  - Model-driven (vs. code-centric), generative approach
  - Non-invasive: Not a 4GL approach, not only for green field dev



The Three Pillars of Holistic Architecture

Models the domain of IT-system development

Models the business for which the IT-system is being built.

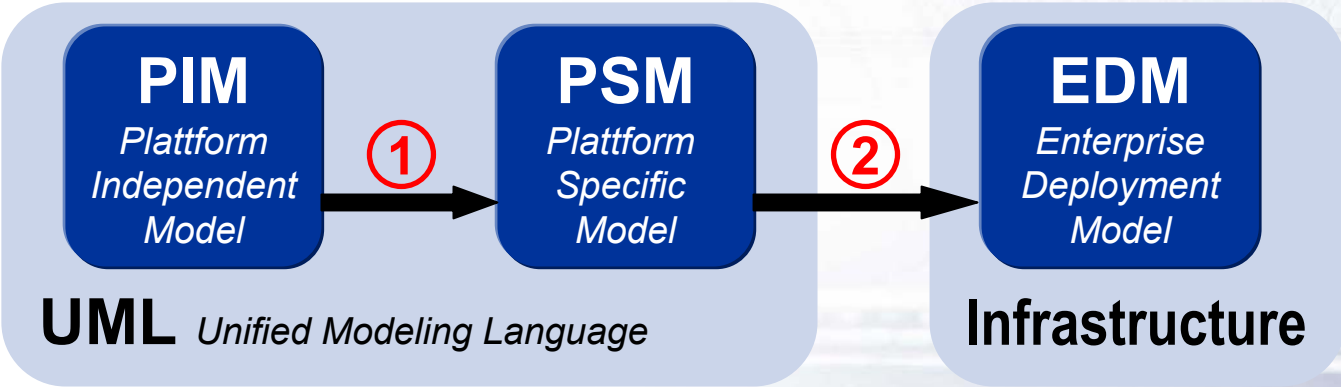
Maps the respective business models “convergently” to available technology.

Architectural Style

- „A *style* and method of design and construction. The *art and science* of designing and erecting [systems].“
- An Architectural Style influences:
  - Design of software architecture
  - UML Modeling Style and MDA approach
  - Selection of tools for automated Model-to-Infrastructure transformation
    - Infrastructure: Source code, config files, build environment, deployment, test harness, ...
  - Software development organization and process

Applied MDA (1)

- Specification of business detail separated from specification of technology detail

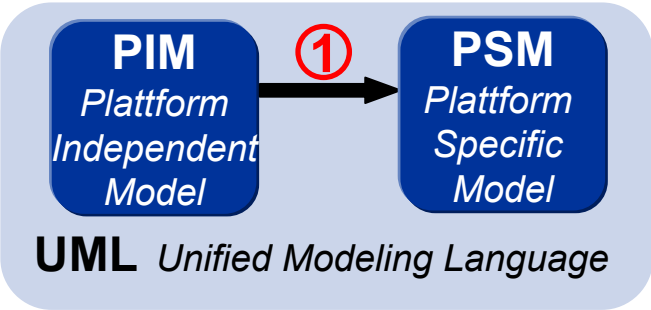


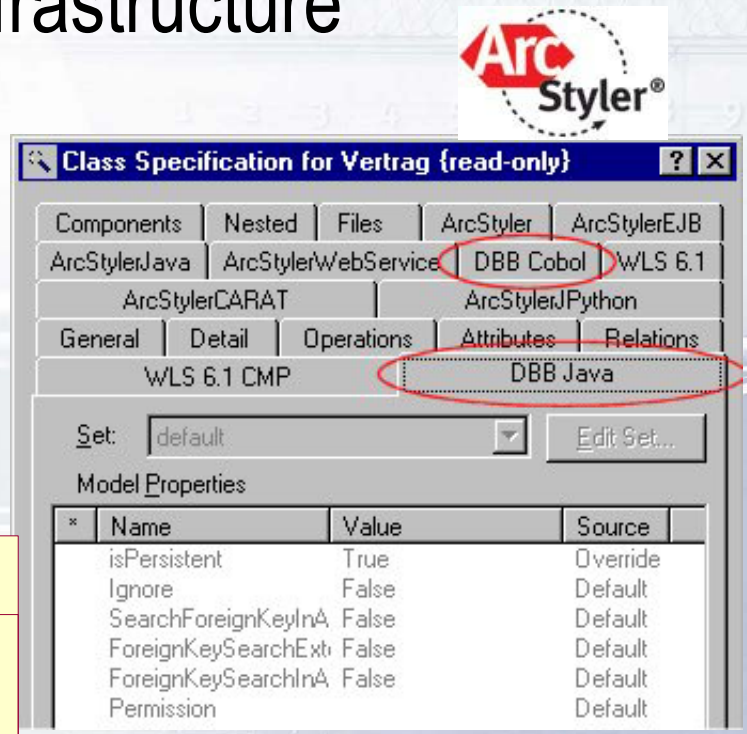
① Annotate model using stereotypes und profiles

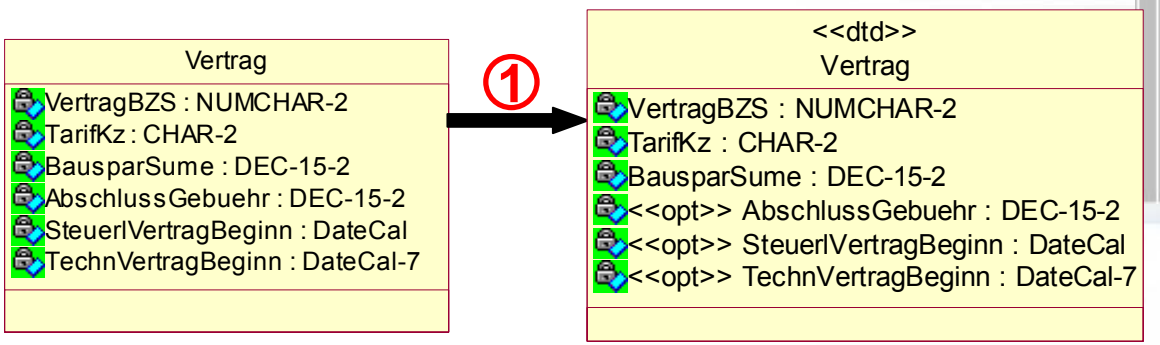
② Generate and compile code

Applied MDA (2)

- Enrichment of model according to well-defined modeling style (stereotypes, property sheets) supplies information necessary for transformation to infrastructure

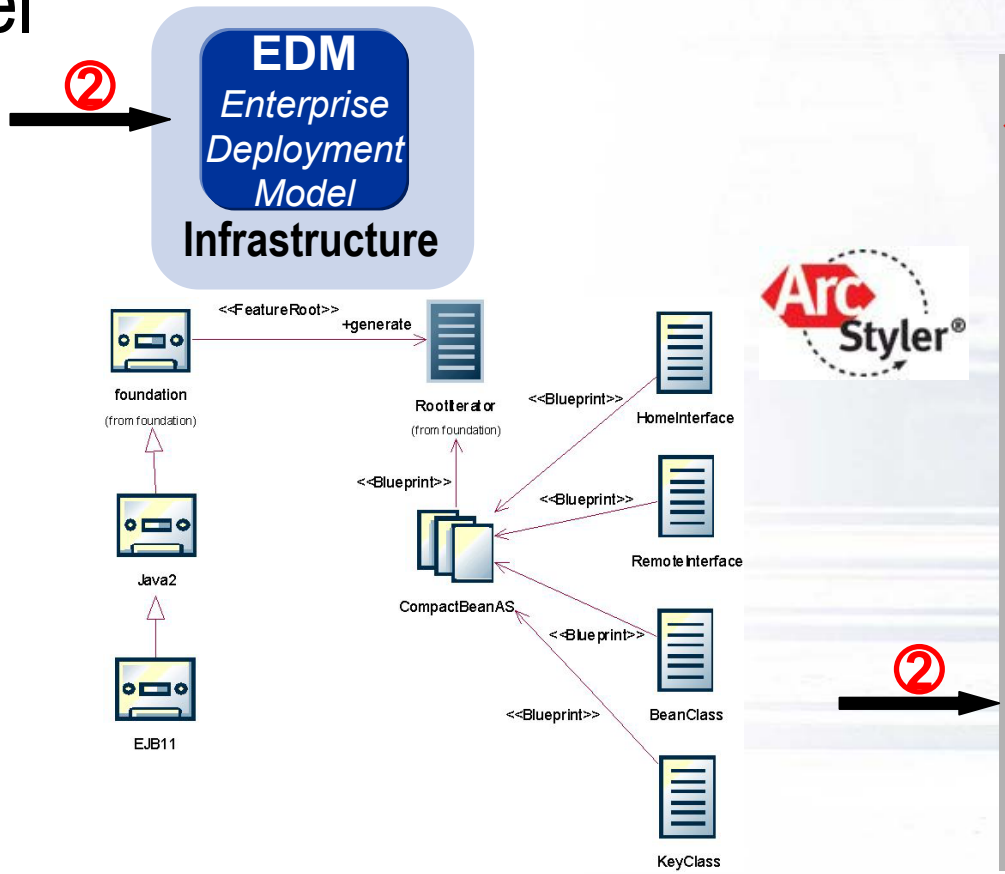






Applied MDA (3)

- Technology projection implemented through pluggable MDA-Cartridges, which are based on a separate UML model

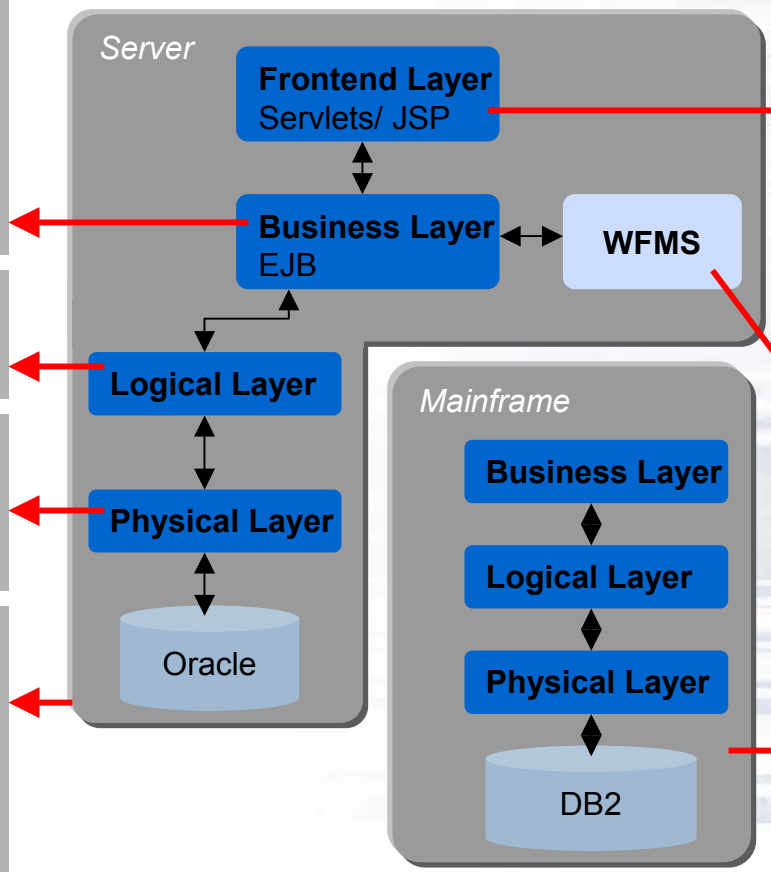


- Value Object
  - Cobol
    - Module, Copies
  - Java
    - Value Objects
    - SAX Handler
    - DAOs
    - Junit Classes
  - XML
    - Test Documents
  - DBMS
    - DDL

Applied MDA (4)

- Essential artifacts are modeled and generated for ***every layer***

- **BL**
  - EJBs, Deployment-Descriptors
  - Stub-Classes (remote Client)
- **LL**
  - Standard Access
- **PL**
  - DAO
  - DDL
- **Common**
  - Value Objects, SAX Handler
  - Junit Tests
  - XML Samples
  - DBMS DDL



- **Struts**
  - Form Classes
  - Action Classes
- **UI Control Flow***
  - Configuration
- **WFMS**
  - Process Def.
- **Mainframe**
  - Moduls (COBOL)
  - Copies
  - Bind Members
  - XML Parser/Builder
  - Stub-Classes Server

* Planned for next iteration

Applied MDA (5)

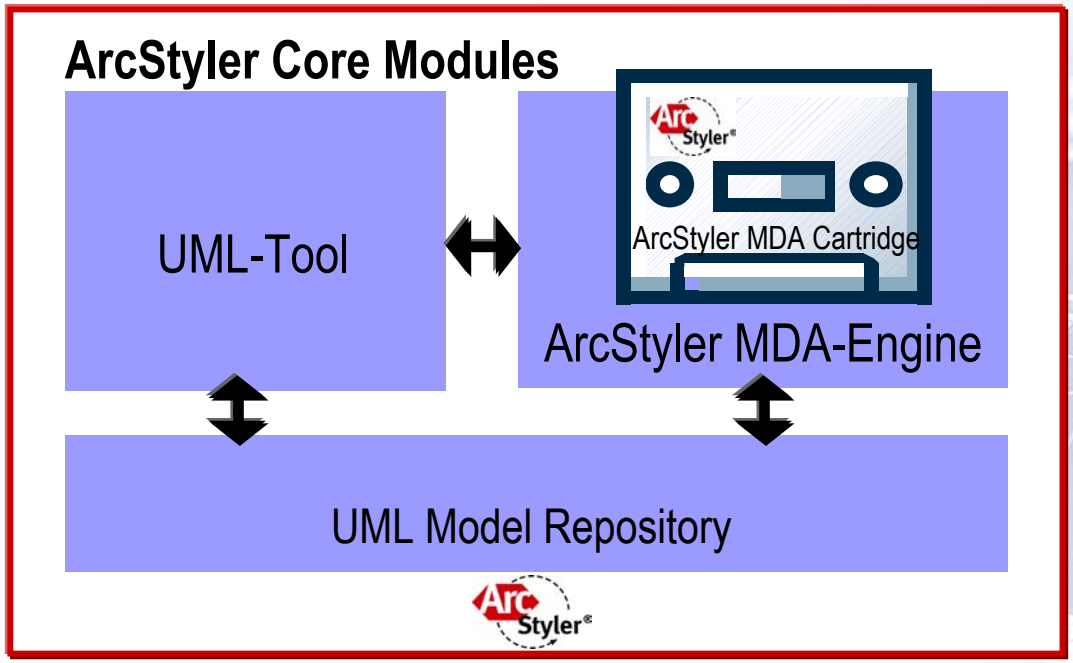
- High efficiency of model driven approach:
  - High proportion of generated code
  - Development of working cartridge prototypes in a few weeks
  - Parallel development of business model and cartridges
  - Low maintenance for cartridges: 5-10% of overall effort

Architectural Layer	Percentage of generated LOC
XML-Interface	100 %
Frontend-Layer	40 % *
Business-Layer Server	60 %
Business-Layer Host	70 %
Logical-Layer Server	70 %
Logical-Layer Host	60 %
Physical-Layer Server	90 %
Physical-Layer Host	90 %

* Project started before ArcStyler Accessors were available, thus lower % here currently (more hand coding than necessary).

ArcStyler

- Comprehensive, end-to-end solution for Model Driven Architecture
- Assistence for developers with important architectural tasks
- Leverages existing, but isolated tools and technologies by automating transformation of information
- Simplifies and expedites entire development life cycle, from PIM to code



Software Development Process

- Iterative approach based on Rational Unified Process
- Version Management
  - CVS for UML model and Java sources
  - Proprietary system on mainframe for COBOL code
- ArcStyler integrates with FTP client to send generated COBOL files automatically to mainframe
- Nightly builds by generated build environment

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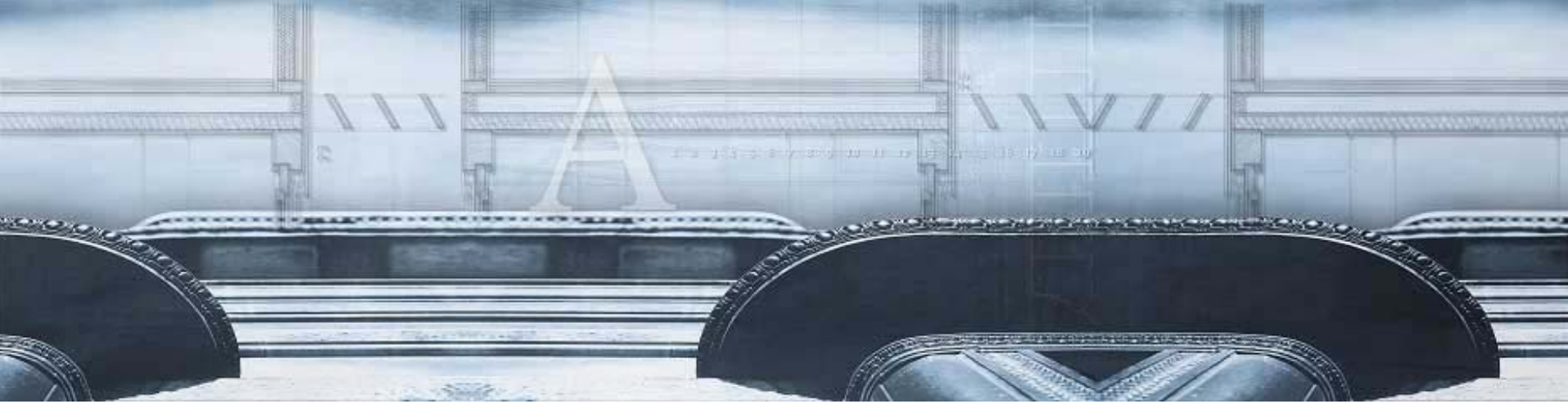
b-online Project Facts

- Large-scale Internet application
  - Runs on 30,000+ workstations in all 1,250 branches of Deutsche Bank
  - Large number of web users (field sales rep, customers, prospects)
- Developed by 35 persons in 5 teams
  - Pilot running in 3 months
  - System in production < year.
- Production use since Dec 2002
- Winner of OMG Award 2002 „Best MDA Application“
- ROI quote from the Deutsche Bank
  - “Immediate savings in the development process due to the MDA-compliant approach and usage of the Architectural IDE for MDA amounted to approx. 40% compared to the estimated figures for development without this approach.”

Core MDA Benefits identified by Deutsche Bank

- Integration
  - Integration of heterogeneous system environments (Internet, EJB, COBOL,...) through infrastructure generation from a common model
- Future-proof, open system
  - Flexibility by keeping the core model devoid of technical detail
  - Technical detail is maintained in the MDA-Cartridges and annotations to the model
- Final quote
  - “Our architectural style with the Model Driven Architecture is an important step in the further development of our mission-critical IT systems.”



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Model Driven Architecture
for the Enterprise

http://www.ArcStyler.com/

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