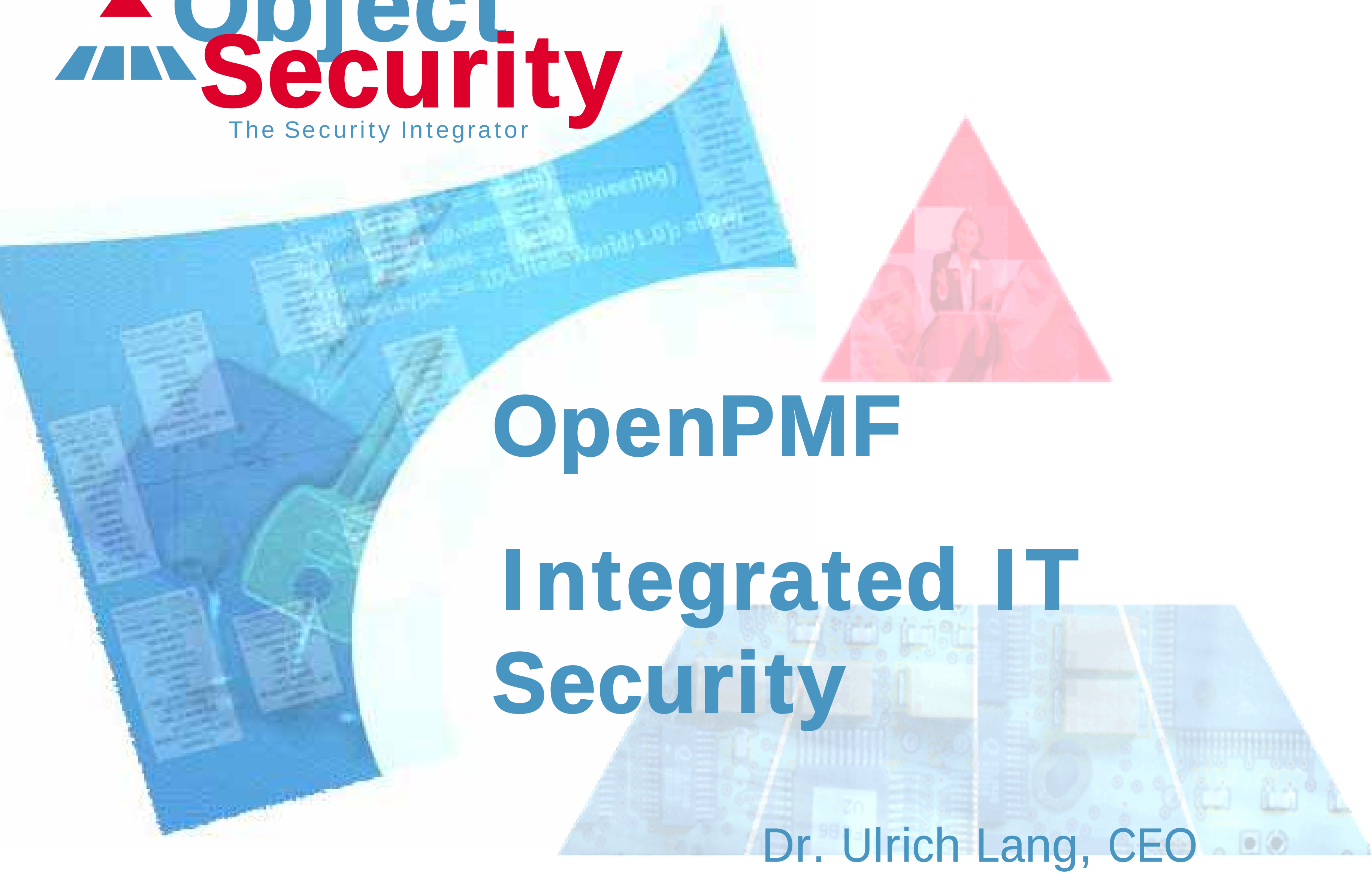
ObjectSecurity

The Security Integrator



OpenPMF

Integrated IT Security

Dr. Ulrich Lang, CEO

Consulting Services

About ObjectSecurity…

- IT security expertise
- Consulting services/solutions in IT security.
- Security specialist for complex, heterogeneous, networked environments
  - Middleware: EJB, CORBA, .NET, XML Web services, CCM
  - Model-Driven Architecture (MDA)
  - Security mechanisms: PKI, PMI, Firewalls, …
- Evolved from University of Cambridge (UK) research, founded in 2000

WWW.OBJECTSECURITY.COM

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Security solutions for blue-chip customers

- Clients
  - Deutsche Telekom
  - General Electric
  - Agilent Technologies
  - US Naval Research Laboratory
  - Twinsoft
  - European Commission
  - Artechhouse Scientific Book Publisher

- Partners
  - Thales
  - Lucent
  - Intracom
  - US Naval Research Laboratory
  - Fraunhofer Gesellschaft FOKUS
  - Various Universities (e.g. Cambridge, London, Paris, Lille, Berlin)

FORTUNE 500

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ObjectSecurity – IT Security Expertise

- Our approach:
  - Complete organization-wide approach from business imperatives through to technology solutions
  - Unified approach to security problems
  - A complete solution from policy creation to technologies
- Benefits:
  - Security at a lower cost and with less effort
  - Greater flexibility and customization
  - Higher assurance
- We do this for systems where other commercial solutions do not exist

ObjectSecurity‘s Expert Know-How

- Security architecture, policy design, risk analysis, policy integration
- Security policy and technology effectiveness analysis
- Integration of security products
- Security technology evaluation
- Applied research and development

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Some of our projects

- Security consulting, development, applied R&D
  - Very complex, distributed environments:
    - Air traffic management
    - Defense communications
  - Very specific, distributed environments:
    - Geographical information system
    - Mobile telecoms application platform
  - More typical distributed environments
    - Secure mobile stock trading system

WWW.OPENPMF.ORG
WWW.SECUREMIDDLEWARE.ORG
WWW.MICO.ORG
WWW.MICOSEC.ORG
WWW.IST-COACH.ORG

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OpenPMF

- In a nutshell:
  - Technology framework
  - Open source software (tool kit)
  - Integration as a commercial service
- Purpose:
  - Add good security to distributed systems
  - Make distributed systems security manageable

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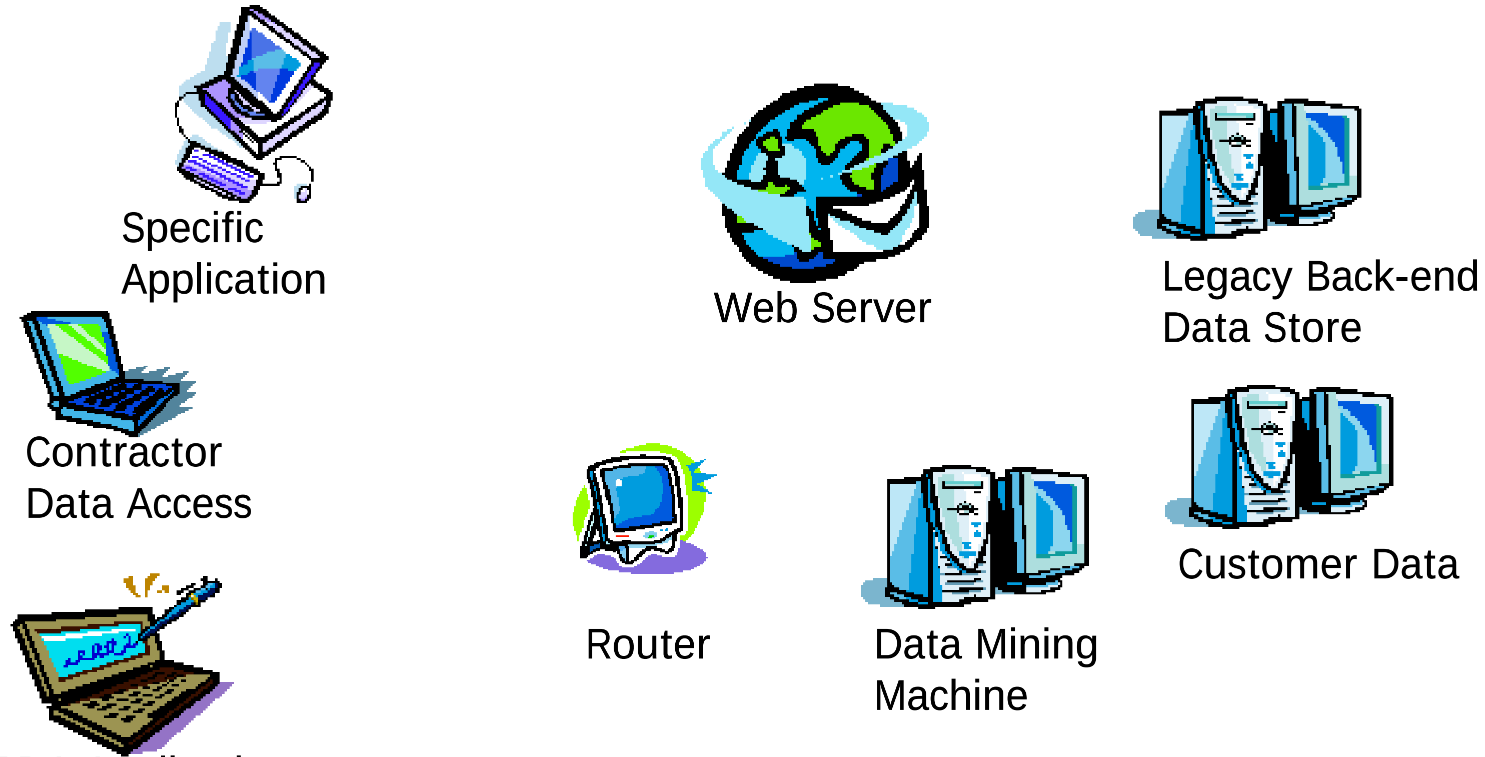
OpenPMF IT Security Integration

Legacy systems create problems

Large enterprises use many separate, incompatible components (often legacy)



Specific Application

Web Server

Legacy Back-end Data Store

Contractor Data Access

Customer Data

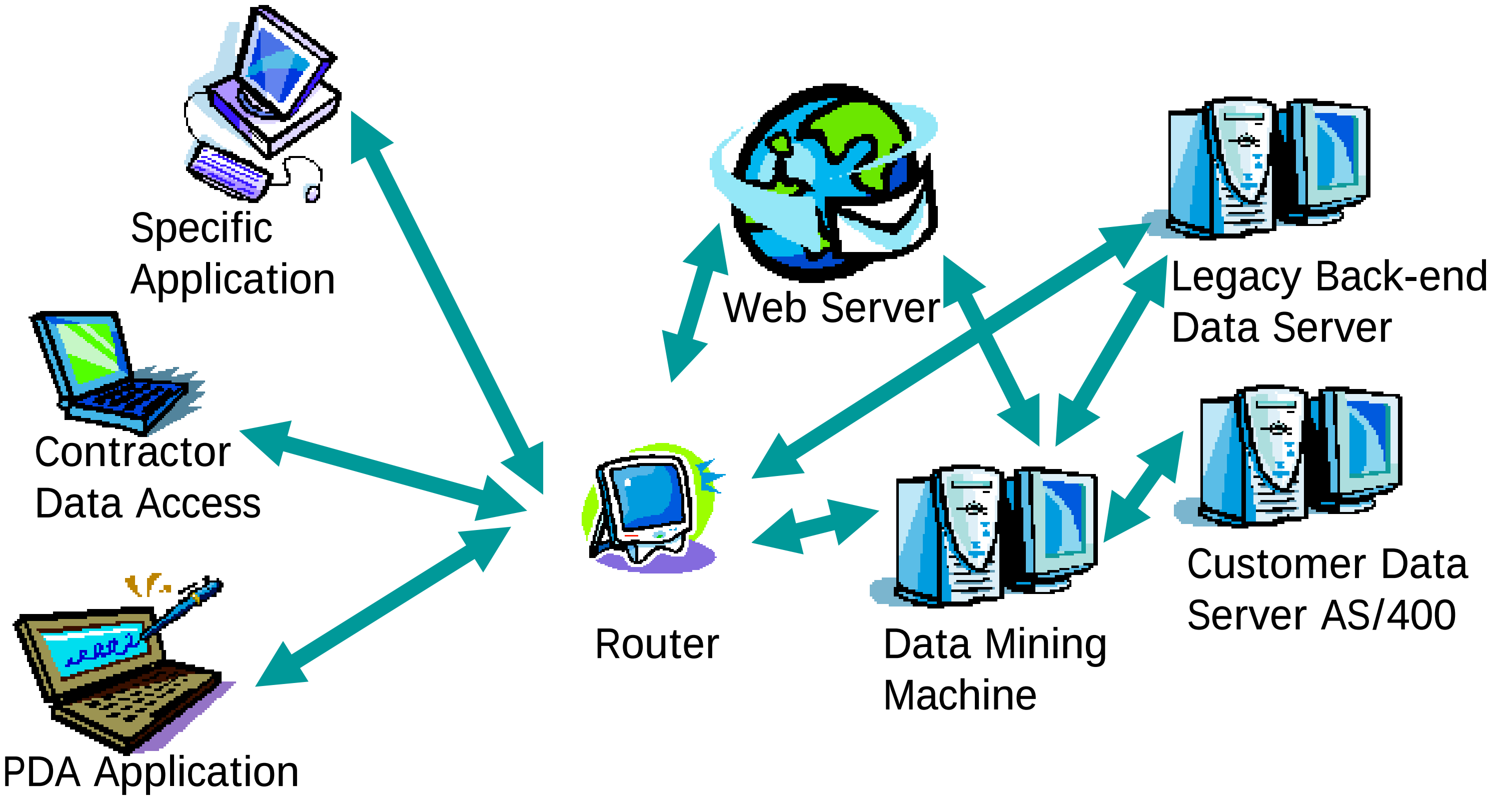
Router

Data Mining Machine

PDA Application

Services and Data Integration

Last decade: seamless, enterprise-wide integration of services and data (e.g. Web Services, EJB, CORBA, .NET,CCM, DCE)



Specific Application

Contractor Data Access

PDA Application

Web Server

Router

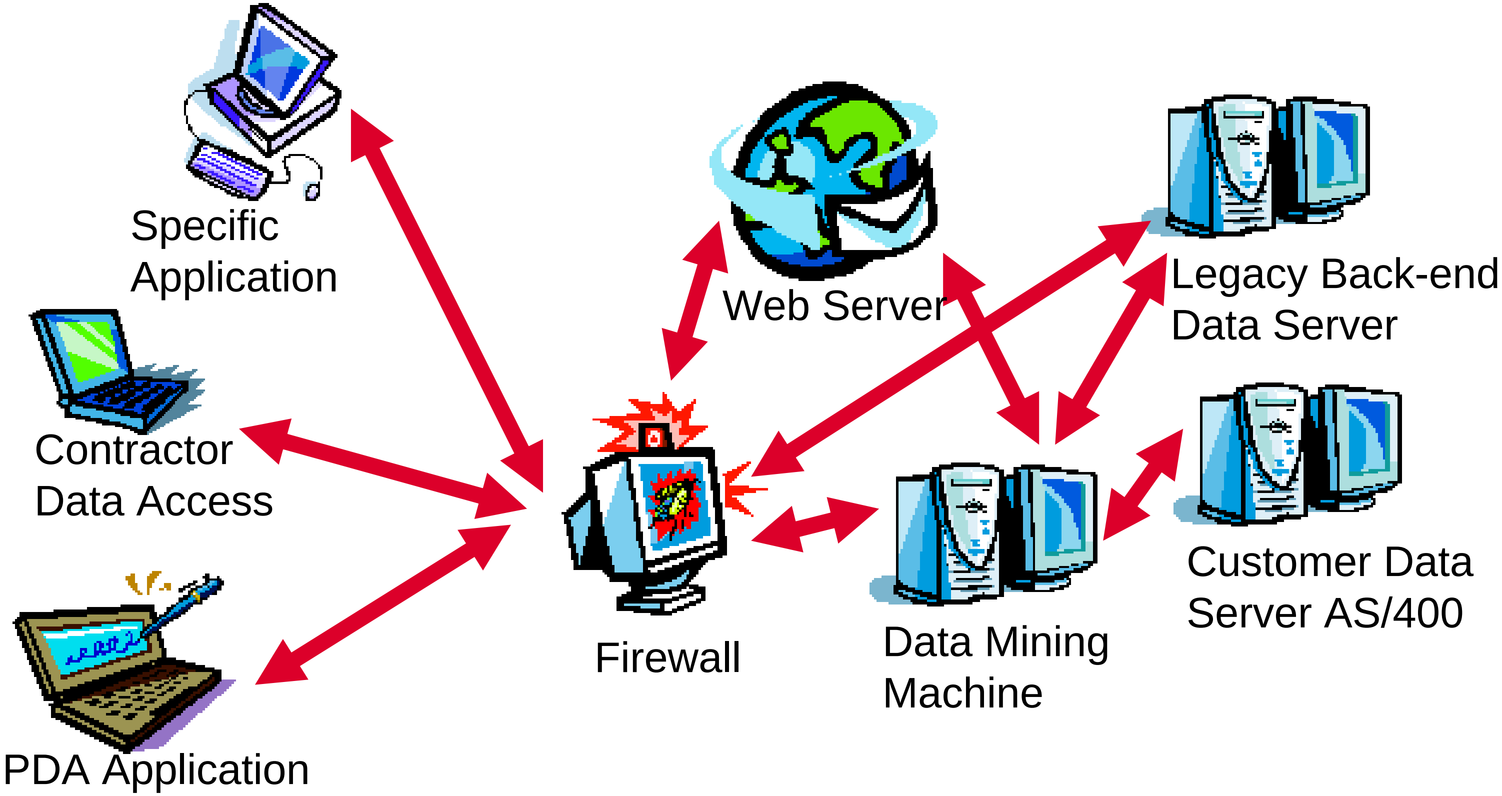
Legacy Back-end Data Server

Data Mining Machine

Customer Data Server AS/400

Adding security has been in isolation

Last decade: protection of information and services increasingly important; mostly "island solutions"



Specific Application

Contractor Data Access

PDA Application

Web Server

Firewall

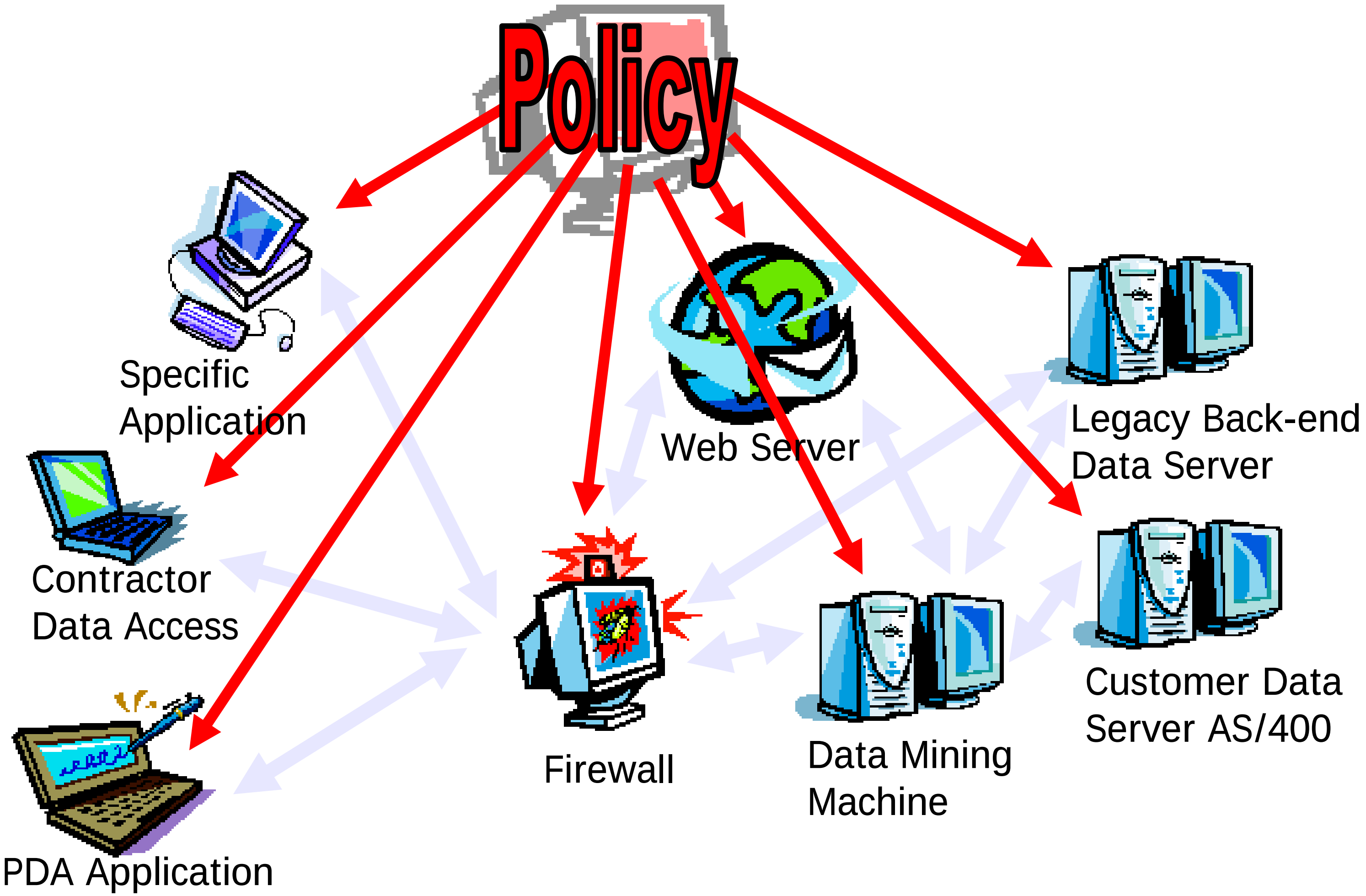
Legacy Back-end Data Server

Data Mining Machine

Customer Data Server AS/400

ObjectSecurity's solution: OpenPMF

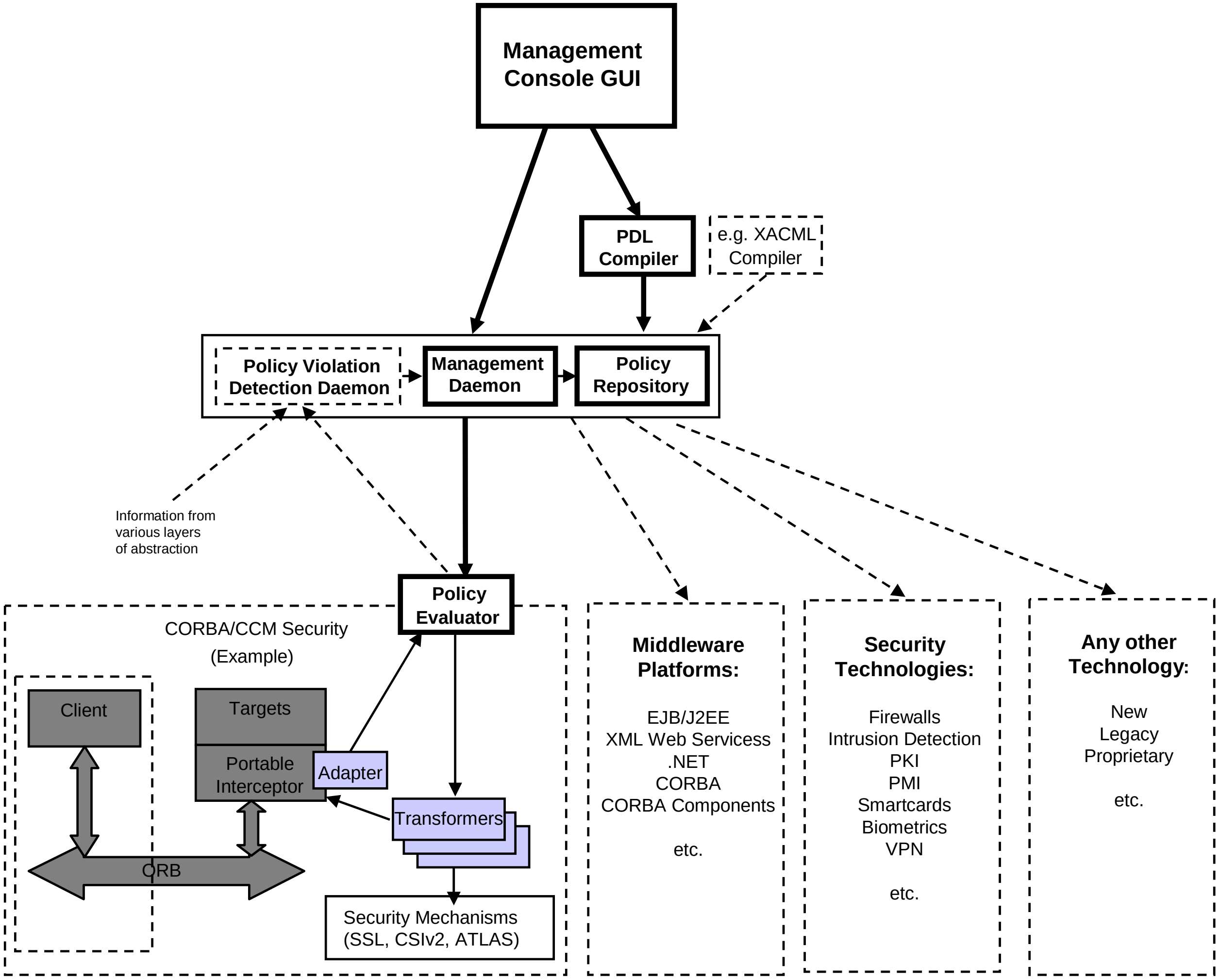
Seamless, customized integration of security



OpenPMF Main Principles

- Apply the OMG Model-Driven Architecture (MDA) approach to security
  - PIM: technology-unspecific policy
  - PSM: technology-specific policy
  - Implementation: enforcement
- Separation of functional and non functional aspects
- Separation of policy definition, storage, evaluation, enforcement
- Flexible composition of simple concepts
- Small, well defined modules (-> assurance) to:
  - Describe, obtain, process security information
  - Evaluate policy
  - Trigger actions

OpenPMF Architecture



Manage Policy

Generate and load Policy

Instantiate Policy Evaluators

Target Platform Integration: Evaluation and Enforcement

Policy Definition Language (PDL)

- Technology-independent language
- Technology-independent identifiers:
  - Initiator, intermediate, target, operation, action
- Hierarchies
- Clustering
- Delegation: weak and strong
- Arbitrary execution of predefined functions possible, for example logging or notification

PDL example

```
policy /OS [*, *] {
    // Admin allowed to write policy, bank server allowed to obtain policy
    policy /OS/Bank [/OS/Bank/Admin, /OS/Bank/Server] {
    // Simple rule
    (initiator.name == /OS/Director)&(operation.name == create)
&(target.type ==  IDL:Bank:1.0) : allow;
    // All clients in group /OS/Accounting are allowed to open the account
    (initiator.group == /OS/Accounting)&(operation.name == open)
&(target.type ==  IDL:Bank:1.0) : allow;
    // List of operations
        (initiator.group ==/OS/Accounting )&(operation.name == {deposit,
    balance})
&(target.type ==  IDL:Account:1.0) : allow;
    // Again a simple rule
        (initiator.name == /OS/Director)&(operation.name == withdraw)
&(target.type ==  IDL:Account:1.0) : allow;
    // Strong delegation
       (client.speaksfor.name == /OS/Director) &
(initiator.group == /OS/Accounting)&(operation.name == withdraw)
&(target.type ==  IDL:Account:1.0) : allow;
  };
};
```

Policy Repository

- Stores the entire security policy
  - Technology-independent rules
  - Consistent
  - Centralised
  - Optimised
  - Hierarchical (for separation of duties)
- Based on OMG Meta Object Facility (MOF)
  - UML model for policy structure
  - Automatic generation of the repository and XMI interchange

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Policy Evaluation

- Interprets security rules
- Efficient runtime representation instantiated
  - At application startup (online repository)
  - At compile time (for embedded systems)
- Evaluators make decisions based on technology-unspecific attributes
  - obtained from Transformers
  - comparison done by Transformers
- Technology-independent, but programming language specific

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Transformers

- Obtain attributes from platform and security mechanism
- Transform specific information to abstract identities
- Operations for the comparison of selector and obtained attribute
- Transformers have to be implemented once per security mechanism & platform (extensibility!)
- High flexibility and extensibility
  - Transformer can obtain arbitrary information
  - Transformers can be stacked

Adapter

- Adapter calls policy evaluator
  - Trigger evaluation of policy
  - Execute decision: Grant or reject invocation
- Integration into call chain platform specific, e.g.:
  - CORBA: Portable Interceptors
  - CCM: Component Portable Interceptors (COPI)
- Adapter has to be implemented once per platform

Central Management

- Central management (via management daemon) reduces costs
  - Users
    - Identities, roles,…
  - Applications
  - Policies
  - Configuration
  - Logging and auditing
- Integration with directory services
  - Already existing information, e.g. about users, can be reused
- Intrusion detection & prevention daemon

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Technology Integration

- Some security infrastructure needed
  - Public Key Infrastructure
  - Privilege Management Infrastructure (ATLAS)
  - Directory Services (LDAP) for user data
  - protocol for delegation & authorisation token transfer, e.g. Common Secure Interoperability v2 (CSIv2)
- Current version tested with:
  - CORBA and CORBA Component Model (CCM)
  - Firewalls
  - EJB/Java
- Future: Web services, .NET

OpenPMF IT Security Integration

Technology Integration

- IIOP Domain Boundary Controller
  - Allows secure usage of EJB, CCM and CORBA over the Internet
  - Protects servers without self defense
  - Integration with packet filter
- Clusters and Grids
  - OpenPMF allows secure sharing of resources and information
    - Prototype: Office computers as number crunchers at night

Technology Integration

- Multiple Independent Levels of Security (MILS)
  - – Separated nodes with different security levels running in OS “partitions”
  - – OpenPMF used to control information flow between nodes
  - – Mainly used by military applications
  - – Civilian use: Damage restriction

Building Blocks for Distributed Systems

- Cross-platform security integration
  - Web Services,
  - .NET,
  - Enterprise Java Beans,
  - CORBA
  - CORBA Component Model,
  - MDA security modelling
  - Security technologies (firewalls, PKI, Privilege Management Infrastructure)

SecureMiddleware

- Project that integrates OpenPMF with Qedo CORBA Components
- First model-driven, component-based, secure application development and integration platform in the world
- www.securemiddleware.org

Conclusion

- OpenPMF benefits:
  - Makes security in complex, heterogeneous, networked IT environments manageable
  - Central administration
  - Flexible policies and consistent policies
  - Reliable policy definition and enforcement
  - Across differing technologies: organisation-wide security policy
  - Integrated validation, optimisation, intrusion detection possible
  - Easy extension to incorporate new security technologies and policy features
  - The effort for development and operation is reduced

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