SOA-BASED FRAMEWORK FOR THE PALESTINIAN E-GOVERNMENT CENTRAL DATABASE

Rebhi Baraka rbaraka@iugaza.edu.ps

Suhail Madouh smadoukh@iugaza.edu.ps

Faculty of Information Technology

Islamic University of Gaza

Outline

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  - e-Government Technical Framework
  - The Current Central Database Model Pros and Cons
- The proposed SOA framework for Palestinian e-government Central Database
  - SOA-based Central Database Requirements
  - SOA-based Central Database Structure
- Framework Prototype
- Usage Scenario
- Conclusion

Overview

- e-Government:
  Defined as a way for an effective use of ICT in the government conduct in order to enhance government-citizen interaction.

- The Central Database:
  One of the core components in the Palestinian e-Government technical framework.

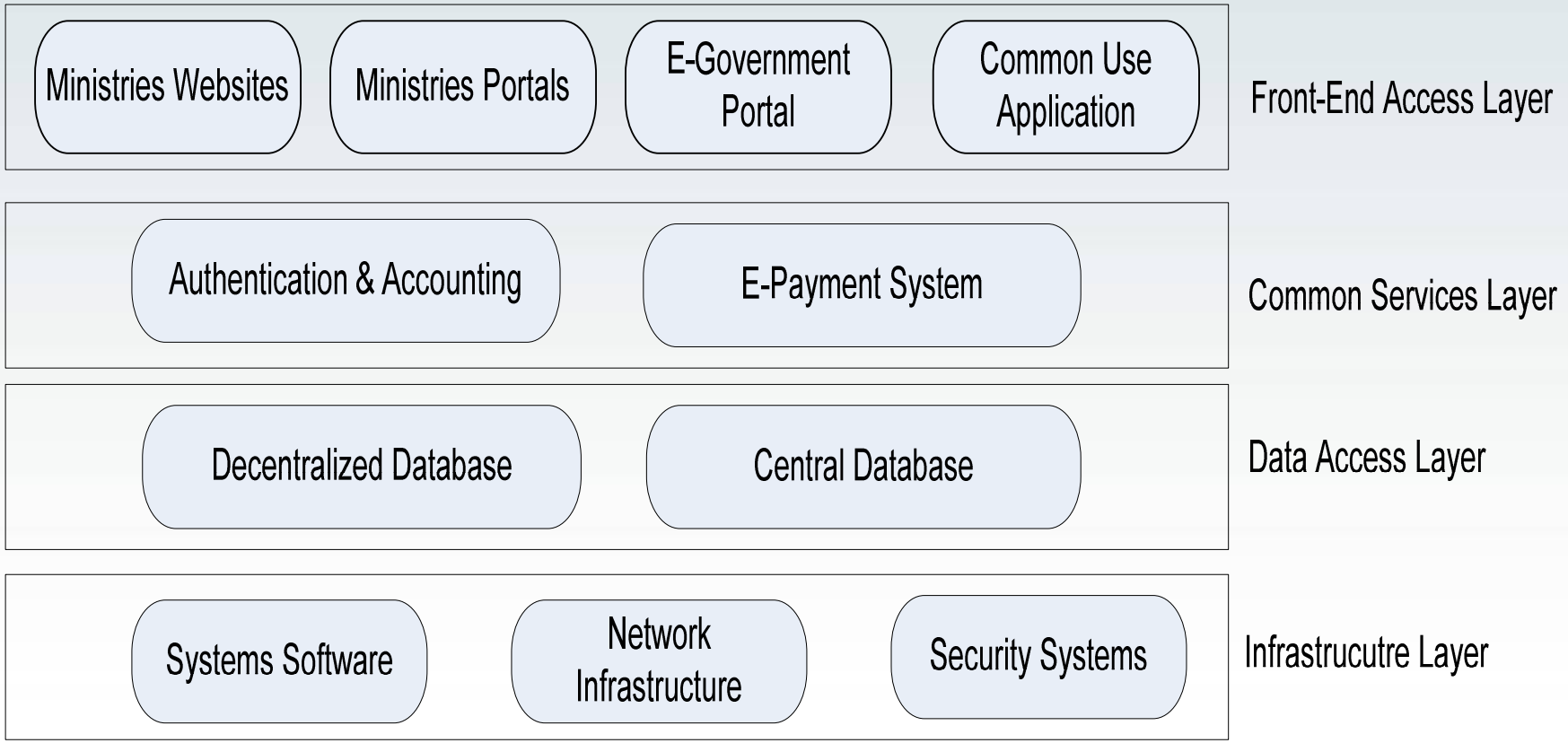
- The realization of the Palestinian e-Government Central Database model is presented and analyzed.

- A SOA-based framework realized through Enterprise Service Bus (ESB) and web services is proposed for the Central Database.

- The proposed framework will enhance the interoperability, flexibility and manageability of the Central Database in the e-Government technical framework.

Palestinian e-government and Central Database Model

e-Government Technical Framework ….(1/6)

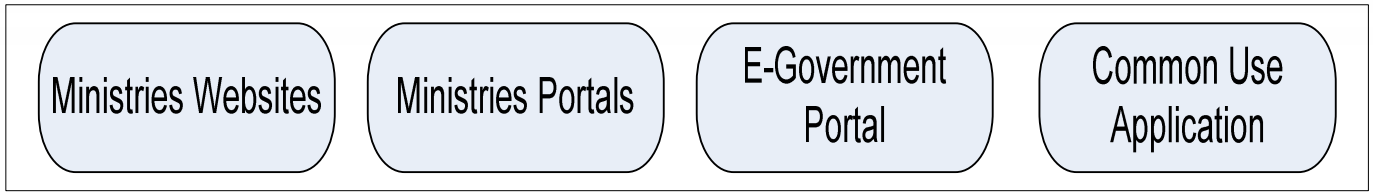


Palestinian e-government and Central Database Model

e-Government Technical Framework….(2/6)

Front-End Access Layer

- Presents the access interface for end users with e-Government services
- Visible part of the e-Government, and all access to e-Government services can be achieved via interacting with this layer.
- Includes application such as e-Government portal, ministries websites as well as ministries applications.

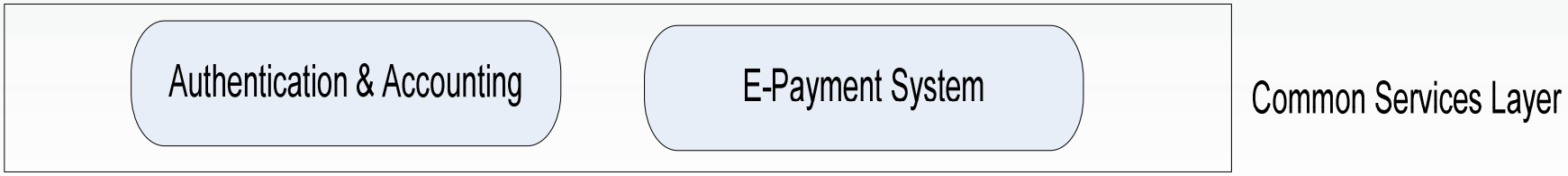


Palestinian e-government and Central Database Model

e-Government Technical Framework….(3/6)

Common Services layer

- Provides front end layer service for services that commonly needed by e-Services.
- Example of Services: Authentication and e-Payment services.

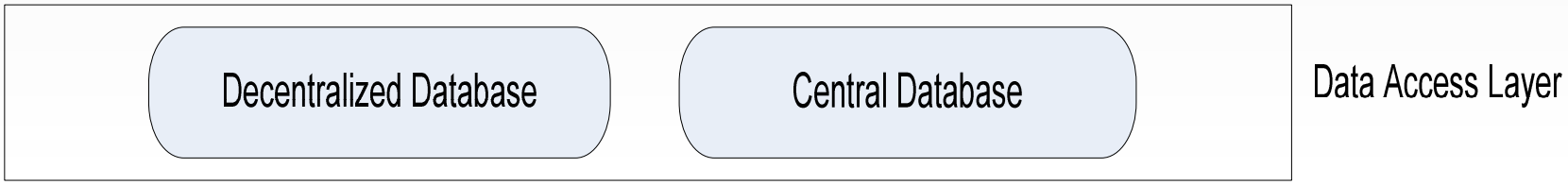


Palestinian e-government and Central Database Model

e-Government Technical Framework….(4/6)

Data Access layer

- Addresses database access gateway.
- Centralized and Decentralized.
- Front end services rely heavily on this layer,
  - e.g. online job submission service, requires access to data from different sources, which turns to be in the centralized database.

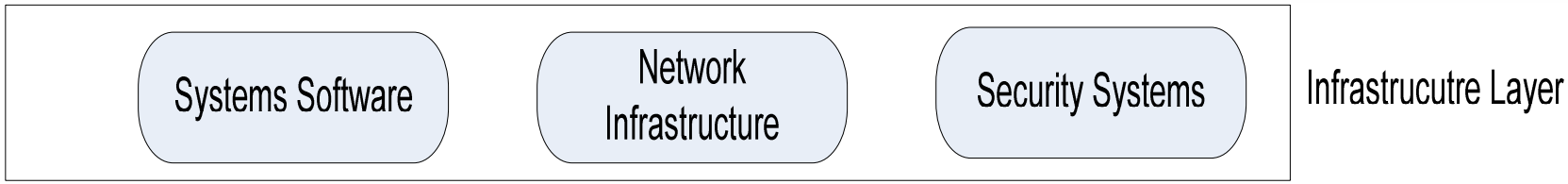


Palestinian e-government and Central Database Model

e-Government Technical Framework….(5/6)

Infrastructure layer

- Physical components and low level software components
  - Government private network
  - Operating systems and services
  - Security systems.
- Presents the interface with networking devices and provides systems functionalities such as:
  - Firewalls and intrusion detection and prevention systems
  - Web hosting
  - Collaboration and email provision capabilities
  - Systems and network management



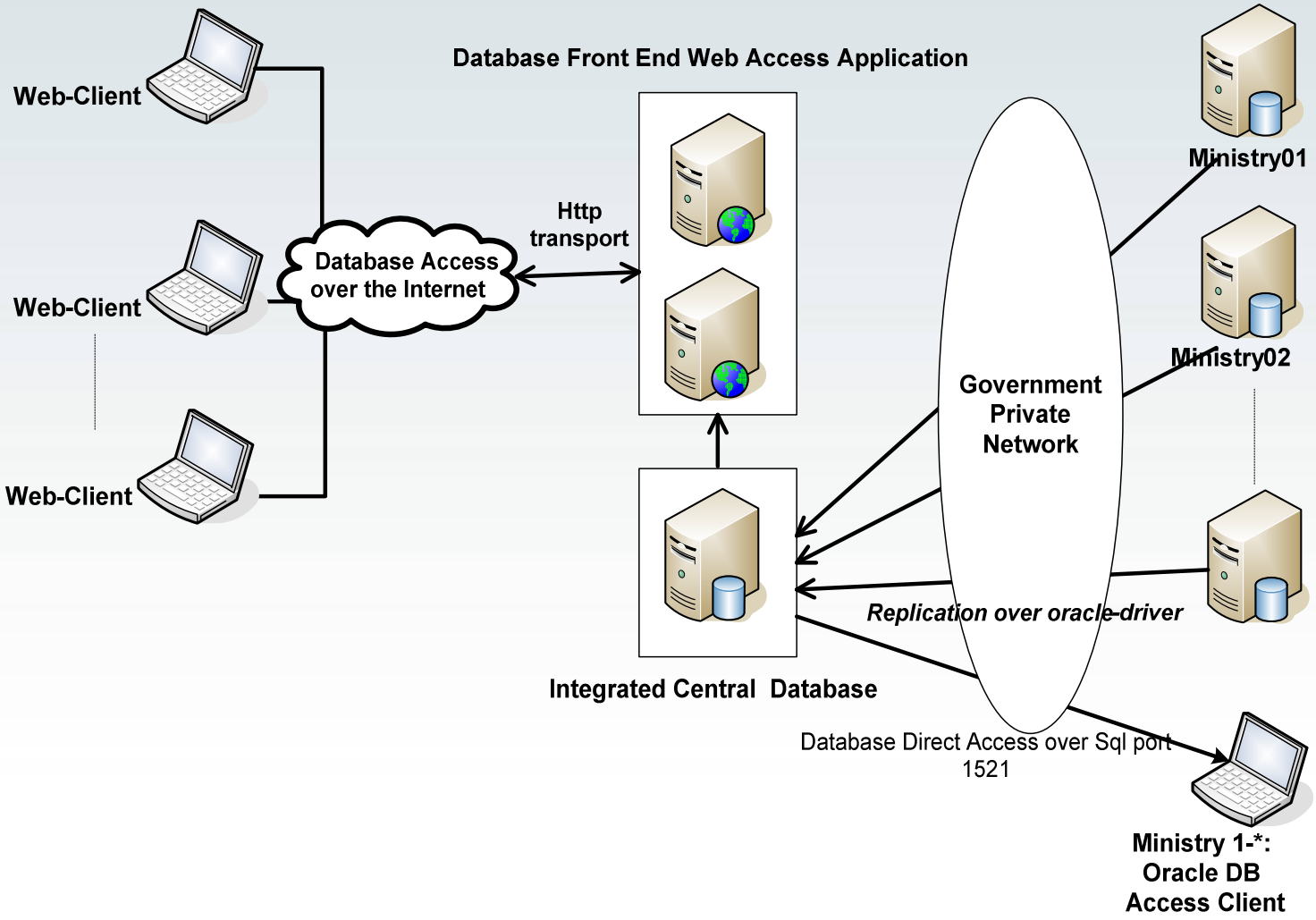
Palestinian e-government and Central Database Model

e-Government Technical Framework….(6/6)

- The overall e-Government technical framework, still immature, not fully implemented, parts of it still need to be realized.
- Communication between layers is not well defined in terms of access protocols and standards.

Palestinian e-government and Central Database Model

The Current Central Database Model Pros and Cons



Palestinian e-government and Central Database Model

The main characteristics of the current model….(1/2)

- Oracle DBMS is used.
- Access mode is read only.
- Replication is one way from ministries databases to the central database.
- Replication is achieved using Oracle utilities, such as Materialized Views and Database Links.
- Web access to the database is done through web servers connecting to Central Database over oracle connectivity API.
- Direct access to Central Database is allowed from government private network, and requires Oracle connectivity API.

Palestinian e-government and Central Database Model

The main characteristics of the current model…. (2/2)

- No direct access to the Central Database from the Internet which is classified as (un-trust zone).
- Client access to the Central Database is done through calling Oracle procedures, with predefined parameters.
- Only synchronous mode of invocation is available
- Security policies are implemented at both network and database access level.
- Monitoring the Central Database is performed based on database parameters, and the monitoring system is not a proactive one.
- Governance issues are limited to managing the main functionalities of the database access.

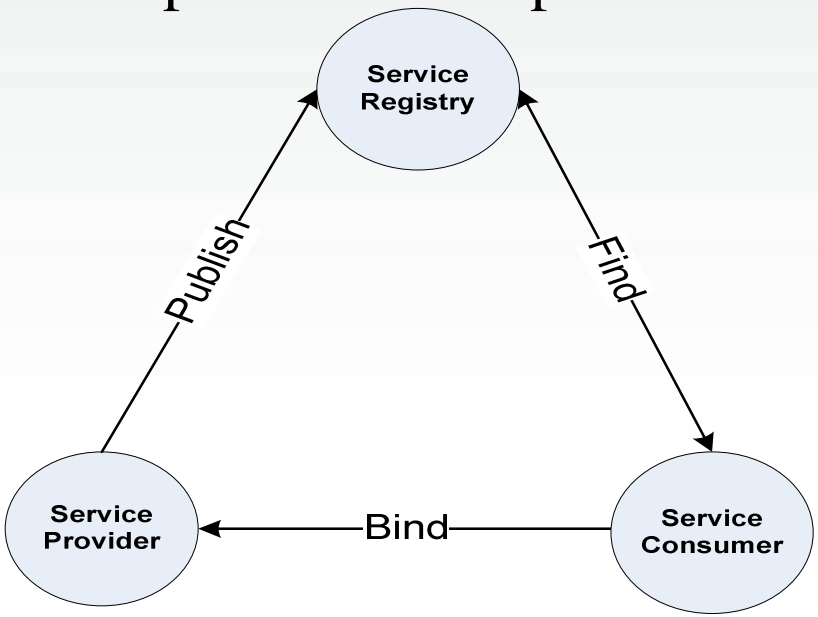
Palestinian e-government and Central Database Model

The Limitations of the current Central Database model

- Replication between databases is based on Oracle Database type.
- Access to the Central Database is restricted to oracle connectivity API
- Direct access to database procedures is achieved only with government private network and through oracle standard sql port
- Central Database has a read-only access mode
- No standard way for describing, finding and invoking the procedures.
- Limited governance issues addressed in the system.
- System monitoring, management and security assurance is built on oracle database itself.
- Lacks governance features such as QoS, usage obligations, SLA, access metric, responsiveness criteria.

The proposed SOA framework for Palestinian e-government central Database

- SOA-based Central Database model relies on SOA solution.
- Why SOA:
  - Open architecture and platform standards
  - Aims to cope with heterogeneous systems and applications in order to achieve high degree of interoperability, scalability and flexibility.
- Integrated with the concept of the Enterprise Service Bus (ESB) and web services



The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Requirements

- The Central Database access should be interoperable, flexible and adhere to standards rather than proprietary commercial software.

- Government ministries need to replicate and synchronize their heterogeneous databases e.g. (Oracle, MySQL, MS-SQL, PostgresSql) with the Central Database.

- Access to government Central Database should be allowed to non-government institutes regardless of their connectivity status to the government private network.

The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Requirements

- Monitoring and management should be separated from the application logic and database procedures access.

- Security should be managed centrally and imposed on all database access, and should not be configured at the procedural level for each database access.

The proposed SOA framework for Palestinian e-government central Database

Framework Layers….(1/3)

- Presentation Layer
- Integration Layer
  - Orchestration
  - Registry
  - Metrics and messaging
- Services Layer
  - Informational Services
    - Provides access to governmental information via web services. E.g., citizen information profile.

    - Operates transparent from the database that holds such information. So, it will be isolated from the underlying databases and the information needed for such services will be provided by the data access service in the data access layer through. Hence if the database type is changed

The proposed SOA framework for Palestinian e-government central Database

Framework Layers….(2/3)

- Provides dynamic connectivity to the data sources, regardless of the underlying data source database type, the informational service will not be changed.

- Informational services will have an adjacent caching database that holds the information retrieved from the data access layer. Cache refresh policy will ensure that the informational services provide recent and valid data

- Replication Services
- Security Services

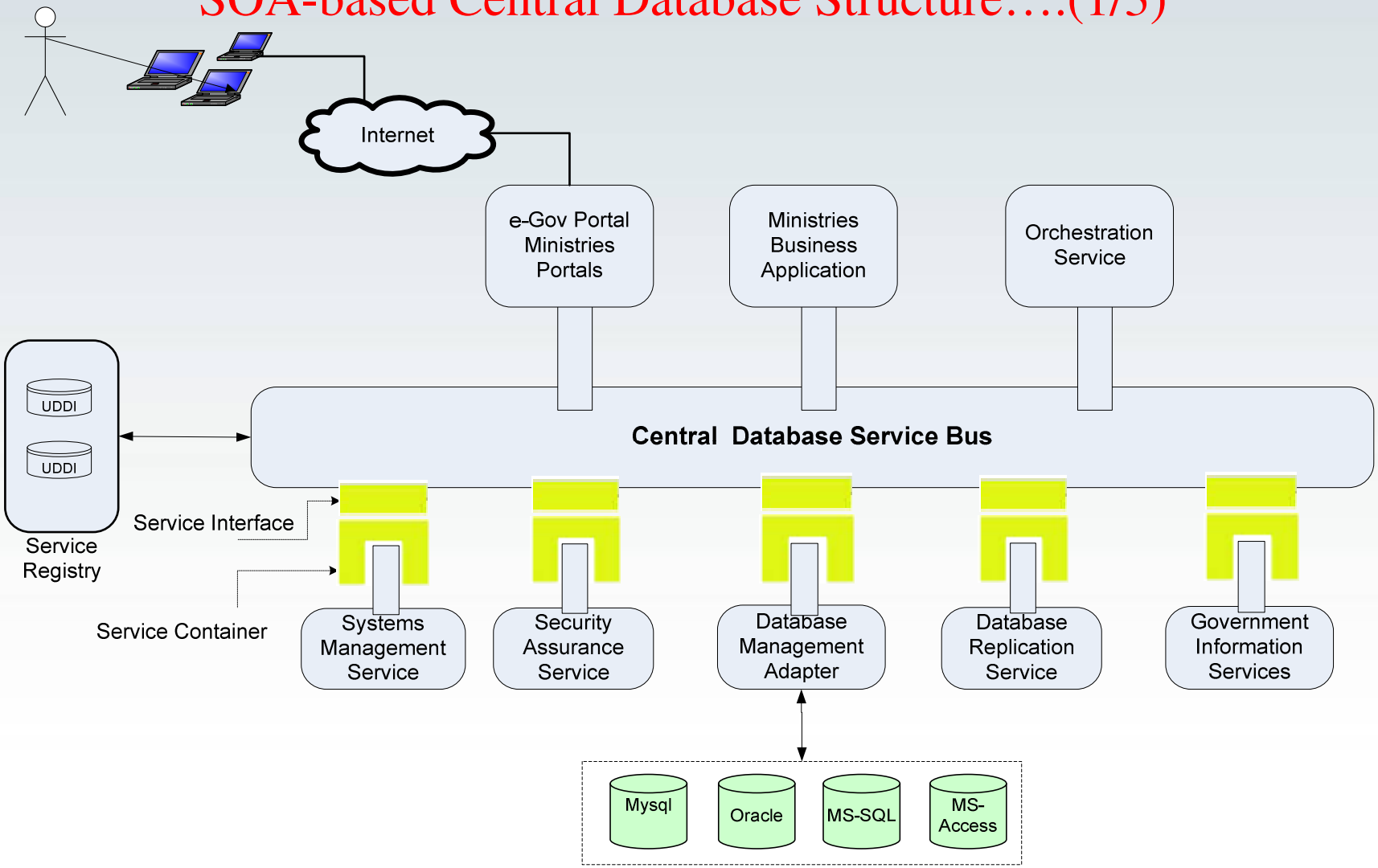
The proposed SOA framework for Palestinian e-government central Database

Framework Layers….(3/3)

- Data Access Layer:
  - Includes data access services and data sources
  - Provides the list of procedures to be called by the Informational services
  - Support connectivity to diverse database types, such as Oracle, Mysql, PostgreSql, and Microsoft Sql
  - Support to connectivity to the Integrated Central Database and ministries database.
  - It accesses the database through predefined procedures previously defined the database operator.

The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Structure….(1/3)



The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Structure….(2/3)

- Central Database Service Bus:
  - The central platform of integration and services for the provision of Central Database access
  - Used and accessed by government institutes connected to government network, as well as over the Internet for non government institutes.
- Service Registry:
  - Used to provide a search point of access to services and database definitions and metadata for all services provided by Central Database model.

The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Structure….(2/3)

- Government Information Services:
  - Web services provide access to basic informational queries.
  - Allow consumers to benefit from government Central Database along with its presentation logic
  - Reliefs from invoking services that interacts directly with the Central Database.
- Database Management Adapter:
  - This adapter will allow the Service Bus to accept requests for data from client systems then invokes the relevant adapter to retrieve the data, and returns it in a standard format to the requester.

The proposed SOA framework for Palestinian e-government central Database

SOA-based Central Database Structure….(3/3)

- Database Replication Service:

Used to manage replication between the Central Database and ministries databases, connections types, mode of replications, access permission, etc. are addressed by this service.

- Systems Management Service:

Used to manage and monitor the Service Bus Central Database and service, as well as the overall operation and performance of the system, built on the concept of *Management Using Web Services*

- Security Assurance Service:

Insures that security policies are adhered to, it will be invoked by different services to add security layer to their functionality.

Framework Prototype

Prototype Overview….(1/3)

The prototype will be composed of 3 databases:

- The governmental database (GovDB) which is oracle 10g.

- The employee records database (DiwanDB) which is oracle 10g, and the data source is from the general personal office.

- The employee contact information database (GccDB) is MySQL, and the data source is from the government computer center system.

Framework Prototype

Prototype Overview….(2/3)

- The governmental database already has snapshot from different ministries databases population registry information called (MoiDB), health insurance information (MohDB), and employee salary information (MofDB).
- The prototype will have three front end web user Interface:
  - User interface to manipulate (read, update, and delete) the database records in both DiwanDB and GccDB.
  - User interface to trigger the replication services for both GccDB and DiwanDB to the GovDB.
  - User interface to query the GovDB via web services, it will use the BPEL for orchestrating different web services for accessing each of MoiDB, GccDB, and DiwanDB.

Framework Prototype

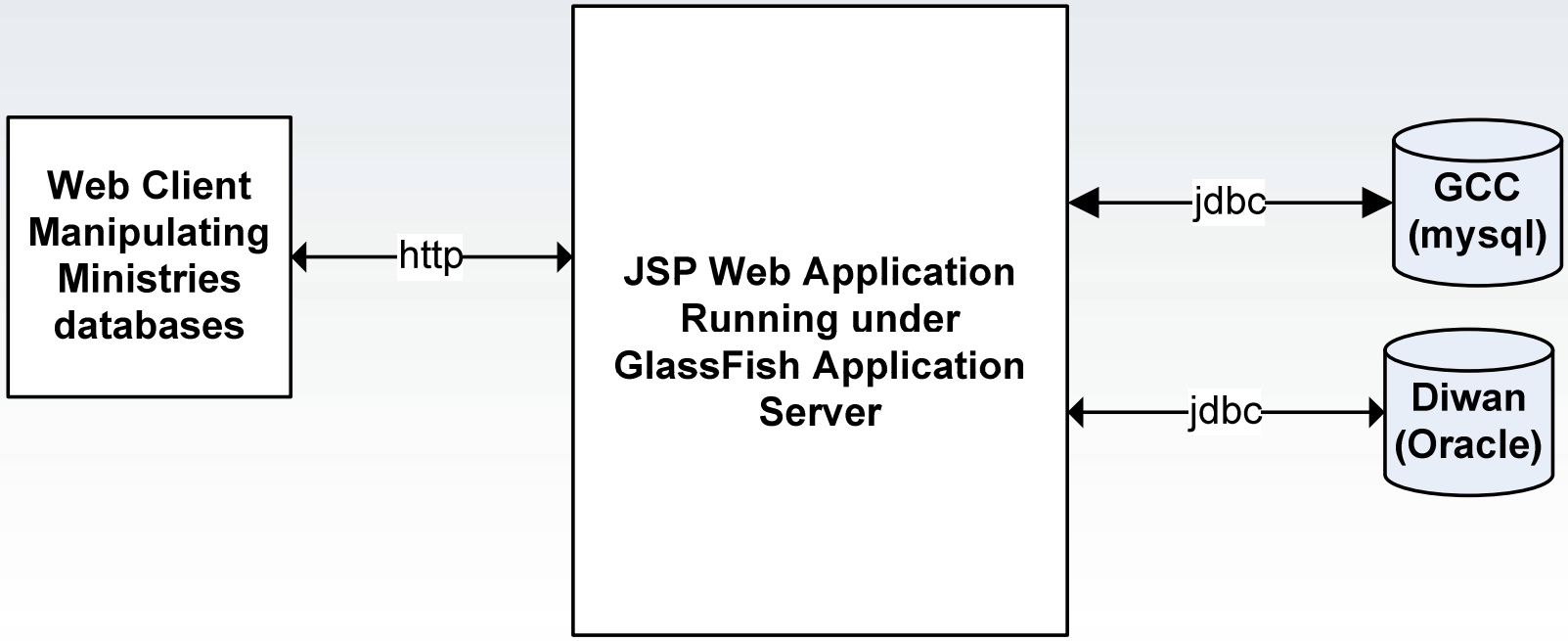
Prototype Overview….(3/3)

- The replication service will use both BPEL and database binding components, and snapshot replication will be used in replication service prototype, in which the whole table is replicated to the GovDB.
- Development Tools:
  - NetBeans 6.7.1,
  - GlassFish 2.1
  - OpenESB

Framework Prototype

Prototype Logical Views….(1/3)

Manipulating ministries databases (DiwanDB, GccDB)

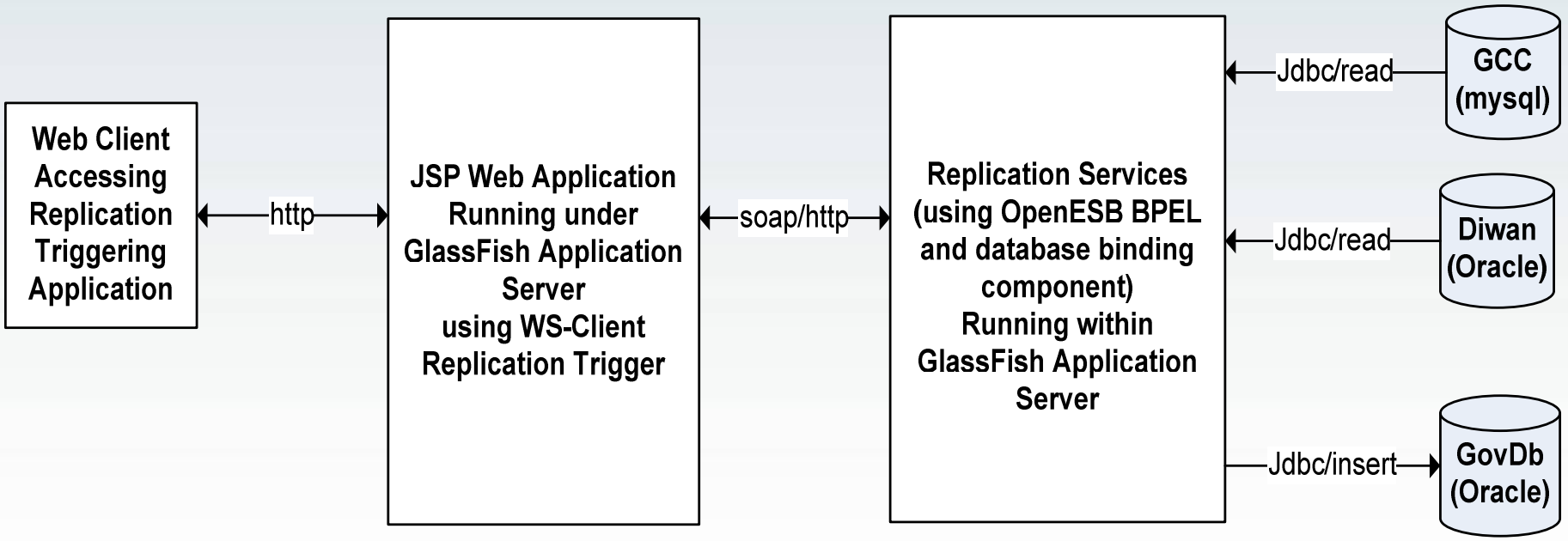


Manipulating Ministries Databases Prototype Logical View

Framework Prototype

Prototype Logical Views….(2/3)

Triggering Replication Services (DiwanDB, GccDB)

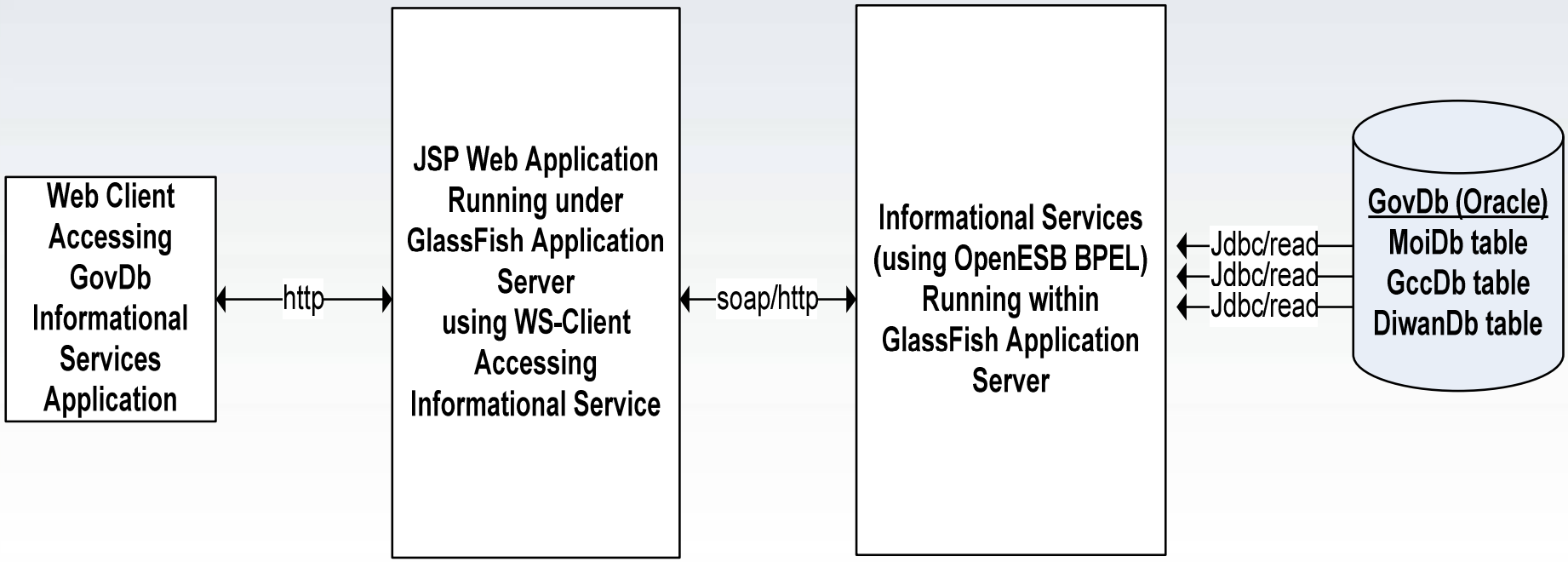


Replication Service Prototype Logical View

Framework Prototype

Prototype Logical Views….(3/3)

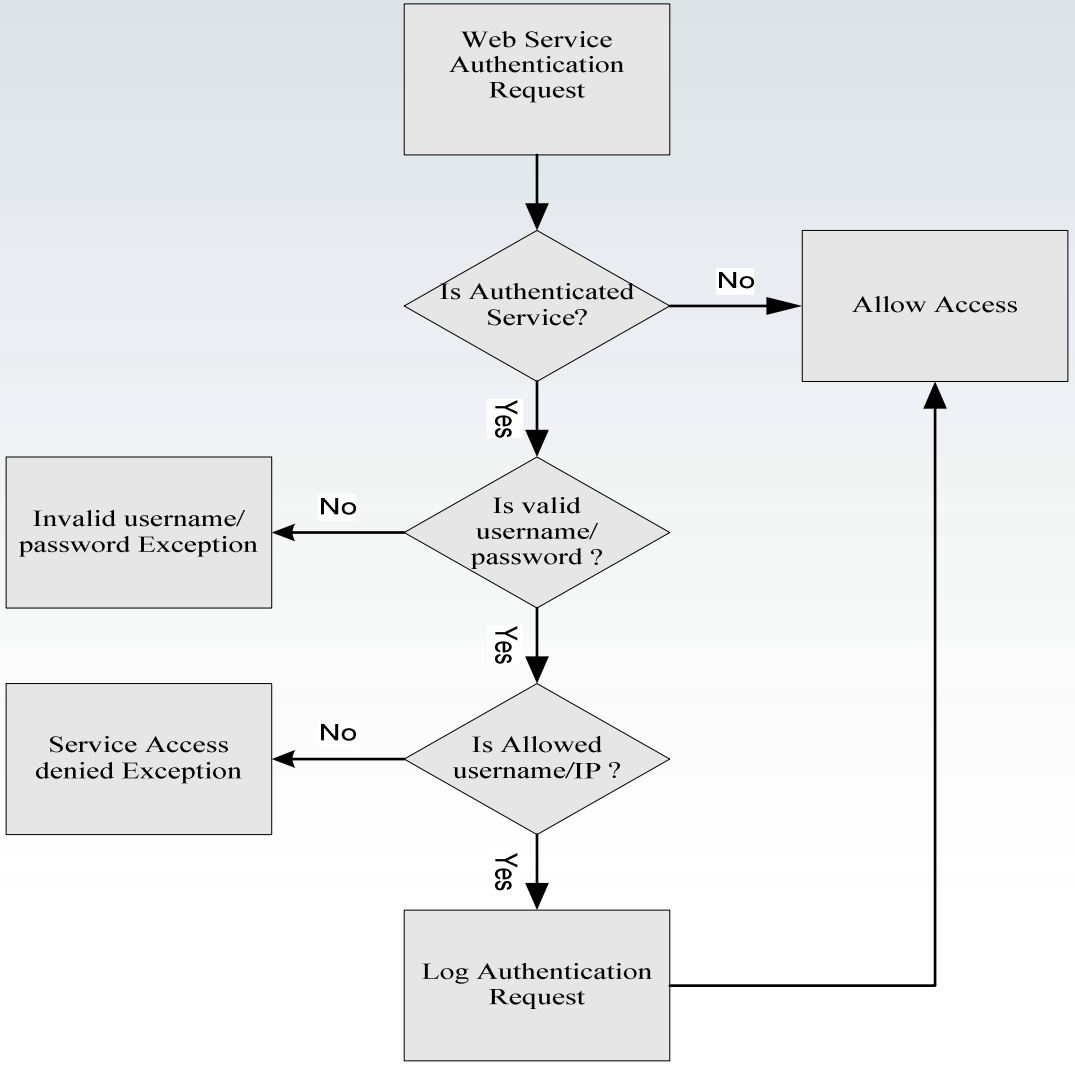
Accessing GovDB information as a service using BPEL composing three web services for DiwanDB, GccDB, and MoiDB.



GovDb Informational Services Access Prototype Logical View

Framework Prototype

Security Assurance Service Logic

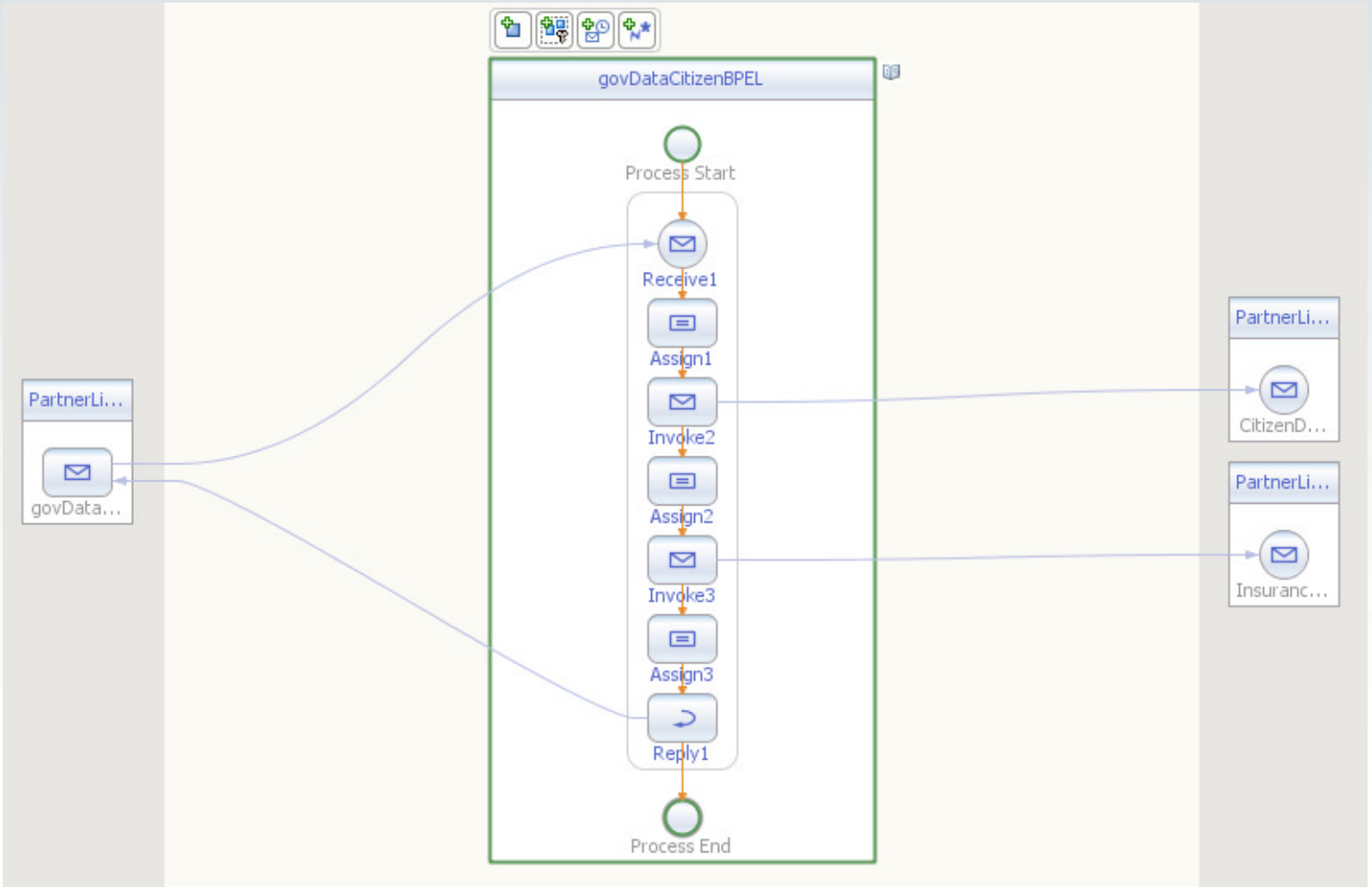


Framework Prototype

Snapshot of Development Environment Informational Services

Framework Prototype

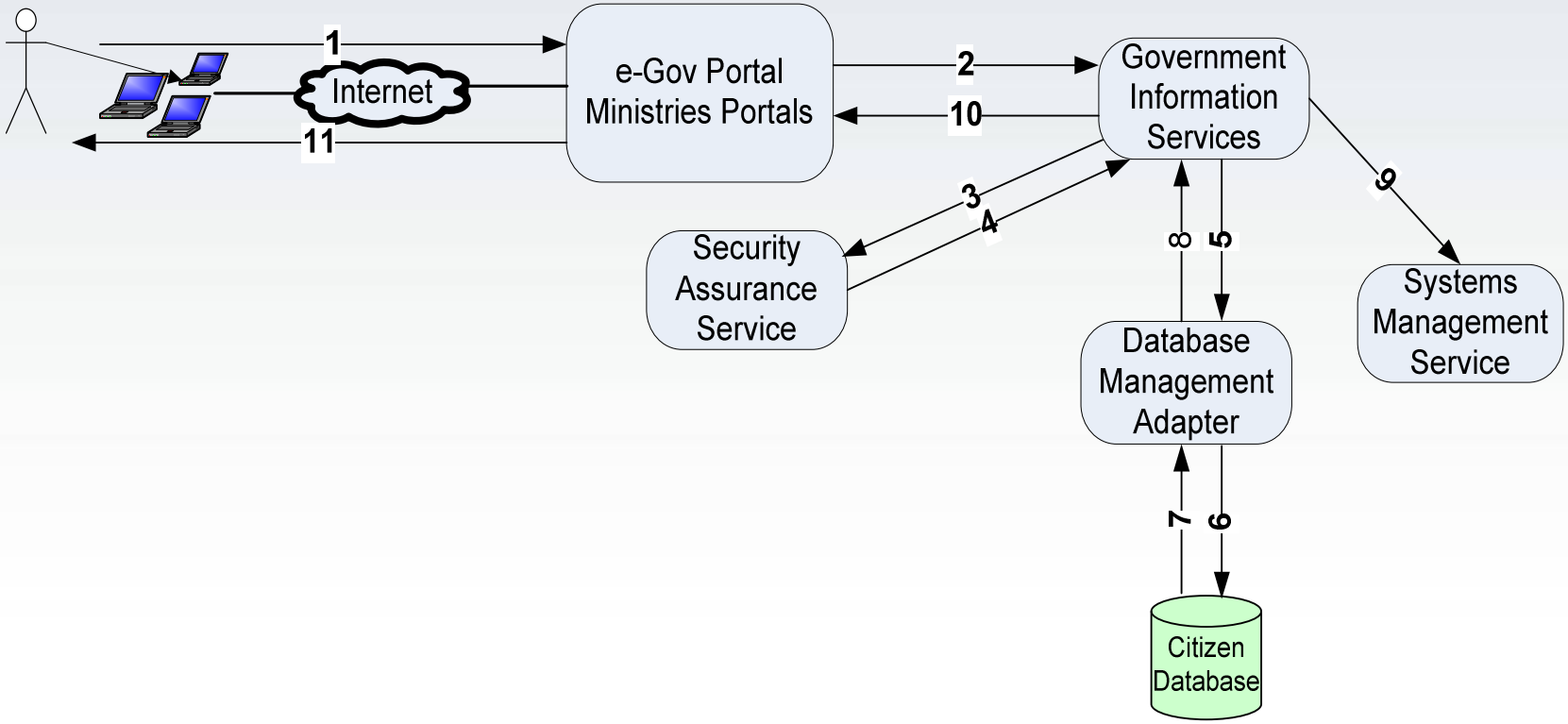
Informational Service BPEL



The proposed SOA framework for Palestinian e-government central Database

Usage Scenario

A citizen would like to check his social status



The proposed SOA framework for Palestinian e-government central Database

Usage Scenario

o Flexibility is achieved by using the standard http transport to carry messages between the web application in e-Government portal and the Government Information Services (either over the government private network or the Internet);

- In the current model of Central Database such access would be carried over oracle-sql port and from the government private network.

o Interoperability is achieved since the web application and the Government Information Services are database-type independent.

- If the low level database that holds the citizen information is changed from e.g. oracle to MySQL, then the change will not affect the web application or the Government Information Services.

Conclusion

- The current Central Database model in the Palestinian e-Government Technical Framework lacks interoperability, flexibility, and manageability.
- A new Central Database model based on SOA solution is proposed that overcomes the current shortcomings.
  - These initial results are encouraging.
  - More work is needed to fully realize the framework.
  - Manageability issue will be addressed through management services that manage and monitor the Central Database service bus and web services.
    - Provide mechanisms for configuration, administration and integration of the framework.

Thanks