Appendix F

Database Design and Development Summary

DATABASE DEVELOPMENT LIFE CYCLE: MAJOR PHASES AND ACTIVITIES

Note: The major activities in each phase indicated here are at a high level. Expand these as necessary to suit the requirements of your database environment. Break down the activities into appropriate tasks.

Project Initiation

Define the scope of the proposed database system.
Establish goals and objectives.
Set values and expectations.
Prepare preliminary justification of the project.
Identify the key business objects of the organization.
Highlight the core business and primary processes in the organization.
List the basic data elements for business objects and processes.
Describe the implementation strategy.
Create a tentative project schedule.
Obtain project authorization.
Initiate project with a clear project initiation report.

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Planning

Interpret the organization's long-term plan to establish the information requirements to be included in the database system.

Consider the general goals, specific objectives, special opportunities, and challenges contained in the long-term plan.

Classify the users in the organization by responsibility levels, business functions, and geographic regions; determine the general data requirements for each user classification.

Review the business objects and the data about these to be included in the database system.

Make preliminary estimates of data volumes.

Review data ownerships across the organization.

Consider issues relating to the recruitment and training of people.

Mention contingencies for possible project failures.

Include new overhead costs.

Complete the database plan.

Feasibility Study

Study the technological feasibility in the specific areas of hardware and systems software. Establish additional needs.

Conduct a study of operational feasibility: take inventory of currently available skills and list the skills needed for the proposed database system; review the list of people with specialized skills; make recommendations for recruitment and training.

Study the economic feasibility: estimate one-time costs for hardware, systems software, database software, communications equipment and software, training, recruitment, special studies, materials and supplies; estimate ongoing costs for hardware maintenance, software upgrades, people, support system, training, materials and supplies.

List possible costs savings from the proposed database system.

Prepare broad estimates of intangible benefits.

Weigh the options for the proposed database system and make recommendations.

Prepare comprehensive feasibility study report.

Requirements Definition

Study overall business operations.

Observe all business processes.

Understand business needs for information.

Interview users and prepare interview summaries.

Study all available and relevant business documents.

Determine information requirements.
Identify data to be collected and stored.
Review data access patterns.
Establish data volumes.
Organize information requirements into data groups.
Document information requirements.

Design

Logical Design

Create semantic data model.
Form user data views from data groups defined in the requirements definition phase.
Integrate data views into the semantic data model.
Include design of the following in the semantic data model:
- Business object sets or entity types
- Relationships between objects or entities
- Generalization and specialization of objects or entities
- Any special object types and relationships

Complete the semantic data model diagram.
Create conventional data model (relational).
Select method for creating conventional data model.
If applicable, use model transformation method:
- Transform object sets into relations.
- Map attributes to columns.
- Map instance identifiers to primary keys.
- Transform relationships by including foreign keys.

If applicable, use normalization method:
- Normalize into fundamental normal forms.
- Normalize into higher normal forms.
- Consolidate normalized data structures into relational data model.

Physical Design

Transform the logical data model into the physical data model.
Map components of relations into files, data blocks, records, and file.
Set the proper file organization for each file.
Define key and other constraints.
Establish performance mechanisms.
Define primary indexes.
Define secondary indexes.

Apply data clustering techniques.
Establish horizontal or vertical partitioning of relations.

Implementation and Deployment

Install DBMS.
Define the logical and physical model in the data dictionary.
Provide application interfaces.
Complete final testing.
Populate database.
Build indexes.
Get user desktops ready.
Authorize users for database access.
Complete initial user training.
Institute initial user support.
Deploy database system in stages.

Maintenance and Growth

Grant and revoke user access privileges as necessary.
Review and maintain concurrency control measures.
Maintain ongoing database backup and recovery techniques.
Perform ongoing space management.
Resolve database problems from time to time.
Monitor database performance through gathering of statistics.
Tune indexes.
Tune queries and transactions.
Tune the schema.
Perform schema changes at all levels for ongoing growth and enhancements.
Apply DBMS version upgrades.