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## **Database Design and Implementation**

Presentation by Rufaro Nyabako, Technical Director



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Time : 17:15 to 18:30

Venue : ZCAS

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The following topics were discussed and supported by demonstrations from real-life experiences.

1. **System Life Cycle**
2. **Review of database models**
3. **The most important design goal**
4. **Design vs Development and Implementation**
5. **MS SQL Server 2005**
6. **The challenges of web databases**
7. **The dot Net development Framework**
  - **What is it**
  - **Its advantages**
8. **Closing Questions and Comments**

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## **Database Design and Implementation**

### **Our Mission:**

To raise the standard of living through effective utilization of databases and information resources.

We know that appropriate utilization of information resources will help reduce ignorance and help us to alleviate poverty. But you and I must do a lot work as system developers – people with the skills and know-how to bridge the gaps between ICT and business.

### **Background**

One of the most important goals of Database design and Implementation is make information resources available on demand and every time, so that business transactions can be executed with full knowledge and without doubt.

In order to make databases as widely available as possible we may install and configure them to run on local area networks or the web, depending on what's best to reach the intended audience.

But as the Internet becomes cheaper and more widely available it, would be unwise to ignore it as a platform for databases and other systems. It is a public network that has proved to work regardless.

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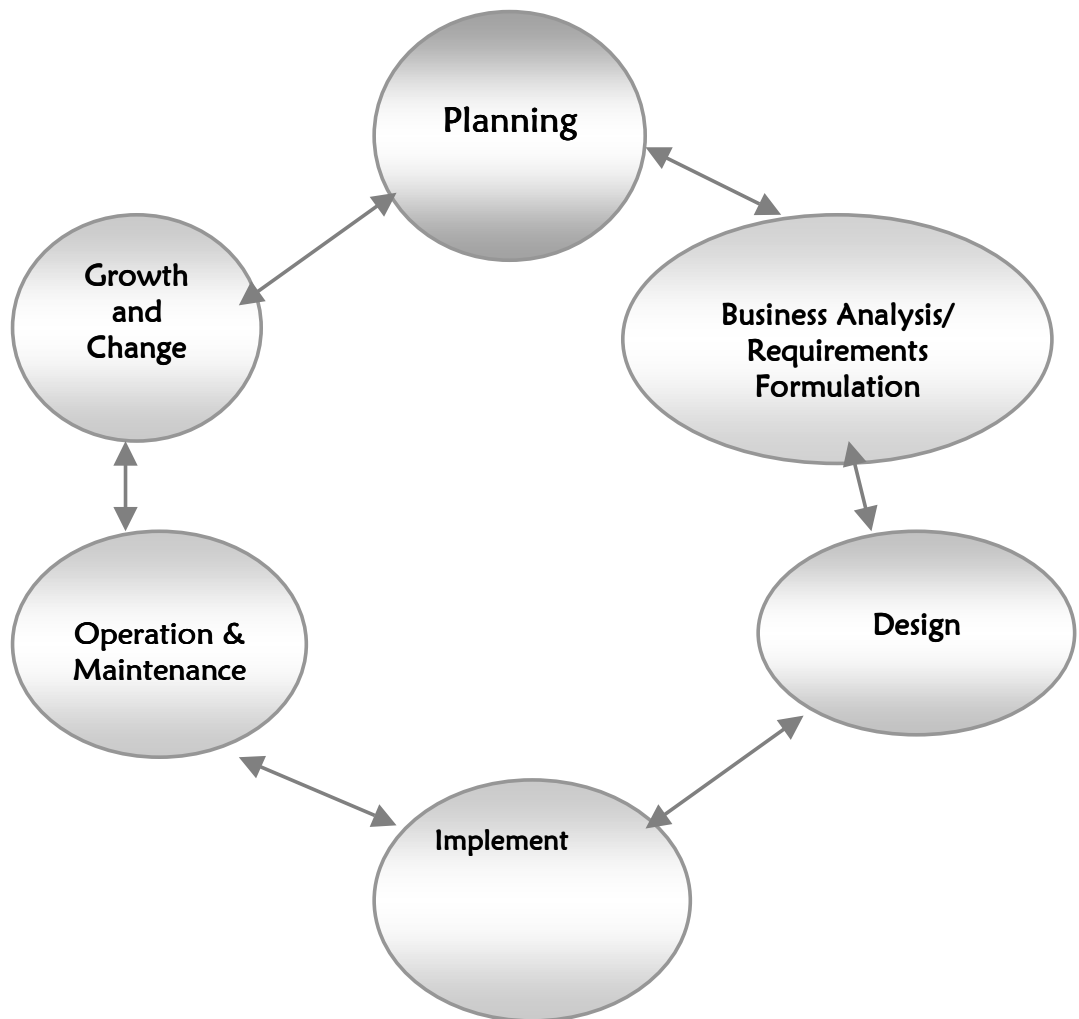
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**Database Design and Implementation**

**System Life Cycle**



- The key deliverables are based on the phases of the life cycle of database system.
- Even during the planning or business analysis development work may be done just for modeling and uncovering the actual user needs.
- Core business challenges must be identified; analyzed and documented otherwise the database will become a white elephant that no one will be able to use.

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## Database Design and Implementation

### Review of Database Models

**Data models are the underlying theories on which database management software systems (DBMS) are built upon.**

**Each model offers functionalities and advantages which are convenient for solving a certain class of information processing needs.**

1. **Relational Data Model – This model represents data as relations or tables. Data are organized in ways that facilitate manipulation of relations. Each entity in a data model translates into one or more tables with or without primary keys.**

**DBMSs such as MS Access, MS SQL Server, Oracle MySQL and a whole lot of them are based on the relational data model. The relational data model is one of the most popular in industry.**

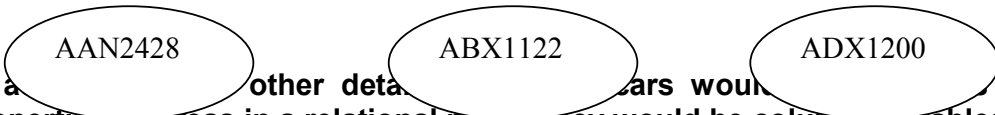
### 2. Object-oriented Data Model

This model represents data and other associated structures as objects. Whereas in a relational model, data about a car could be organized as table as shown below;

RegNumber	Make	Year	Fuel Type
AAN2428	Mazda	1995	Petrol
ABX1122	BMW	2006	Diesel
ADX1200	Nissan Patrol	2008	Diesel

In an object oriented data model cars records are organized as objects whereas in the relational model they are organized as rows.

In OOP (Object oriented programming) you would visualize the car data as below;

In a  other data, cars would be object properties whereas in a relational model they would be columns in tables. Furthermore each object would also have within it the ability to take certain actions eg, retrieve its own make,

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## Database Design and Implementation

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### **Review of Database Models**

**Microsoft SQL Server 2005 is an example of a DBMS that uses both the relational and OOP data models.**

### **Design Goals**

- Provide access to records 24/7  
Even though manual records are cumbersome to retrieve people have access to them most of the time – so databases must not only make it easier, they must provide the records 24/7
- Generate reports and statistics on demand  
Different stakeholders will demand different reports and statistics depending on the questions they are trying to answer using records. Provide them.
- Provide access to records and information resources on a need to know basis  
Staff and other stakeholders will have different privileges and roles, respect stakeholder roles – provide configuration tools to enable them to enforce their own business rules.
- Guide operations and support decision making processes  
Design database views and other structures to support decision-making and business processes
- Enhance an organization's core business  
Design the database in such a way it informs and guides certain core business operations e.g. A library for an educational institution.

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## Database Design and Implementation

Design Processes • Goal: Provide a database application that will guide and support core business operations

- Design the underlying database model – The aim of this process is to uncover the major players or entities in the information model necessary for resolving the user's challenges. This process includes identifying and analyzing database entities.

For example if you are designing a Library database application some of the major players will be students, books, CDs etc

- Identify the records and information needs – The major players will generate records as they transact, they will also require certain records and reports to get things done. The system must capture these records and provide the necessary reports and statistics if it is to be useful.

- Identify and analyze user views – The database will support different stakeholders with different records and information needs. Design specific user views to support different groups of users.

For example in a library database application, students information needs will not necessarily be the same as the needs of lecturers or even the Librarian.

- Normalize database tables – This removes un-necessary redundancies. However, every design process must aim to make life easier for the user so sometimes it may be necessary to allow some bit of redundancy.

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## **Database Design and Implementation**

### **Implementation Processes**

Goal: Convert the logical data model into a physical database

- Convert normalized entities into tables – This also includes defining attributes, data types and even specifying primary keys to facilitate data access and retrieval.
- Implement indexes for rapid access to records –Indexes are necessary to speed up data access
- Implement Views to facilitate retrieval of records
- Use referential integrity to ensure database integrity
- Develop stored procedures or VB assemblies for automating database maintenance tasks

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## **Database Design and Implementation**

### **Demo System**

We have implemented a variety of model database system for customers in diverse business areas including education, revenue collection and even tourism operations.

You are free to run these model applications so that you get a feel of how database applications can be applied to solve different classes of problems.

Click on <http://www.infoholdings.com>

And choose demo databases once you get to our website.

Drop me an email if you have any questions or if you want a password so that you do some of the super user operations like creating users.

My email address is [nyabako@infoholdings.com](mailto:nyabako@infoholdings.com)

### Challenges of Web Databases

- Configure Web Database Servers – You will need a database server available on the web. The challenges of web and database servers are different from the challenges of a LAN server.

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- Poor Internet Connections – Broadband internet is becoming more affordable and available this becomes – so this is becoming a less pressing problem.

- Integration with web sites – Use the traditional web site to provide context for the web database. This makes it easier for users and stakeholders.

- Web hosting – Not all web hosting facilities are able to run web database applications. Let us know if you need this service. We have hosting facilities that allow you to host and run the following database technologies;

MS SQL Server 2005

MS SQL Server 2008

My SQL

PhP

The Dot Net Framework

Unlimited Universal Email

And many more other technologies

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The dot Net Framework

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**•What is it?**

It is a development platform based on the principles of Object-oriented programming, supporting a variety of programming languages including VB .Net, ASP.Net, C#, Java and many others. Even DBMSs such as MS SQL Server 2005 are supported by the .Net Framework.

It is important to developers because it makes it easier to develop large-scale applications. The .Net Framework provides thousands of pre-built software components that developers can use to build new applications. Therefore these are development tools that every developer needs to be familiar with, whether they develop databases or front end applications.

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**• How will it help your organization?**

Use the .Net Framework if you want to develop robust database applications or any other applications.

Given that your organization has put in adequate time and resources in mastering the technology, you will save a lot of time and improve the quality of custom applications.

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**Questions and Comments**

Please email me your questions and comments [nyabako@infoholdings.com](mailto:nyabako@infoholdings.com) or call me on my mobile on +260.955.818.627

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