Ninevah University
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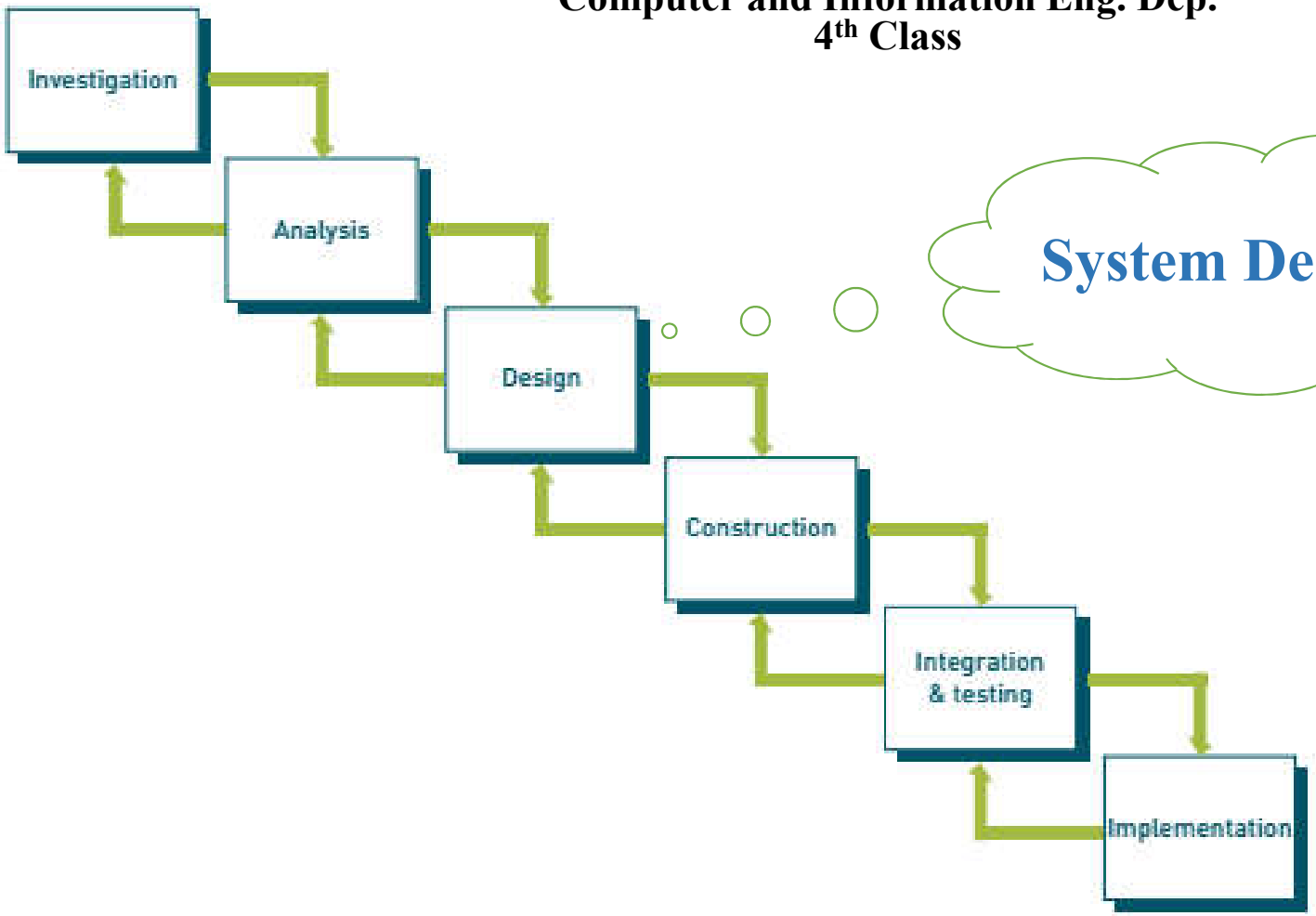

System Design

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System Design

The purpose of system design phase is to answer the question, “How will the information system solve this problem?” The primary result of the system design phase is a technical design that details system outputs, inputs, controls, and user interfaces; specifies hardware, software, databases, telecommunications, personnel, and procedures; and shows how these components are interrelated. In other words, system design creates a complete set of technical specifications that can be used to construct the information system. The steps of system design:

1. **Identify and recruit team leader and team members.**
2. **Develop schedule and budget for system design activities.**
3. **Design user interface**. Most systems provide a sign-on procedure that requires identification numbers, passwords, and other safeguards to improve security and prevent unauthorized use. With a menu-driven system, users select what they want to do from a list of alternatives

Principles of Good User Interface Design

Principle	How to Apply
Strive for consistency	Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.
Offer informative feedback	For every user action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.
Offer simple error handling	As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible instructions for handling the error.
One primary action per screen	Every screen should support a single action of real value to the user.
Provide progressive disclosure	Show only what is necessary on each screen. If the user is making a choice, show enough information to allow the user to choose and then display details on a subsequent screen.
Strive for aesthetic integrity	The graphic design elements used in an interface should be simple and clean, pleasant to look at, and easy to understand.

4. Design System Security and Controls.

The system analysis phase identified areas where system security and controls need to be defined. During the design phase, designers must develop specific system security and controls for all aspects of the information system, including hardware, software, database systems, telecommunications, and Internet operations, as shown in Table. Security considerations involve error prevention, detection, and correction; disaster planning and recovery; and systems controls. The goal is to ensure secure systems without burdening users with too many identification numbers and passwords for different applications. After the controls are developed, they should be documented in standards manuals that indicate how to implement the controls. The controls should then be implemented and frequently reviewed. It is common practice to measure how often control techniques are used and to take action if the controls have not been implemented. Organizations often have compliance departments to make sure the IS department is adhering to its systems controls along with all local, state, and federal laws and regulations.

Controls	Description
Input controls	Maintain input integrity and security; their purpose is to reduce errors while protecting the computer system against improper or fraudulent input. Input controls range from using standardized input forms to eliminating data-entry errors and using tight password and identification controls.
Processing controls	Deal with all aspects of processing and storage; the use of passwords and user authentication controls, backup copies of data, and storage rooms that have tight security systems are examples of processing and storage controls.
Output controls	Ensure that output is handled correctly; in many cases, output generated from the computer system is recorded in a file that indicates the reports and documents that were generated, the time they were generated, and their final destinations.
Database controls	Deal with ensuring an efficient and effective database system; these controls include the use of user authentication controls and passwords, without which a user is denied access to certain data and information. Many of these controls are provided by database management systems.
Telecommunications controls	Provide accurate and reliable data and information transfer among systems; network controls include firewalls and encryption to ensure correct communication while eliminating the potential for fraud and crime.
Personnel controls	Ensure that only authorized personnel have access to certain systems to help prevent computer-related mistakes and crime; personnel controls can involve the use of user authentication controls and passwords that allow only certain people access to particular data and information. ID badges and other security devices (such as smart cards) can prevent unauthorized people from entering strategic areas in the information systems facility.

5. Design Disaster Recovery Plan.

Is a documented process to recover an organization's business information system assets including hardware, software, data, networks, and facilities in the event of a disaster. It is a component of the organization's overall business continuity plan, which also includes an occupant emergency plan, a continuity of operations plan, and an incident management plan. A disaster recovery plan focuses on technology recovery and identifies the people or the teams responsible to take action in the event of a disaster, what exactly these people will do when a disaster strikes, and the information system resources required to support critical business processes. Disasters can be natural or manmade.

Various Disasters can Disrupt Business Operations

- **Intentional Man-Made Disasters**
  - ✓ Sabotage تخريب
  - ✓ Terrorism ارهاب
  - ✓ Civil unrest اضطراب

- **Accidental Man-Made Disasters**
  - ✓ Auto accident knocks down power lines to a data center
  - ✓ Backhoe digs up a telecommunications line
  - ✓ Operator error
  - ✓ Fire

- **Natural Disasters**
  - ✓ Flood فيضان
  - ✓ Tsunami
  - ✓ Hurricane /cyclone اعصار
  - ✓ Earthquake
  - ✓ Volcanic eruption بركان

Mission-Critical Process: A process that plays a pivotal role in an organization's continued operations and goal attainment.

Hot Site: A duplicate, operational hardware system that is ready for use (or immediate access to one through a specialized vendor)

Cold Site: A computer environment that includes rooms, electrical service, telecommunications links, data storage devices, and the like

Cloud computing has added another dimension to disaster recovery planning. If your organization is hit by a disaster, information systems that are running on the cloud are likely to be operational and accessible by workers from anywhere they can access the Internet.

Files and databases can be protected by making a copy of all files and databases changed during the last few days or the last week, a technique called:
Incremental backup. This approach to backup uses an **Image log**, which is a separate file that contains only changes to applications or data. Whenever an application is run, an image log is created that contains all changes made to all files. If a problem occurs with a database, an old database with the last full backup of the data, along with the image log, can be used to re-create the current database.

6. Design Database

The database provides a user view of data and makes it possible to add and modify data, store and retrieve data, manipulate the data, and generate reports. One of the steps in designing a database involves “telling” the database management system (DBMS) the logical and physical structure of the data and the relationships among the data for each user. Recall that this description is called a schema, and it is entered into the DBMS using a data definition language. A data definition language (DDL) is a collection of instructions and commands that define and describe data and relationships in a specific database.

7. Perform Feasibility Analysis

As a result of the work done during the design phase, the project team has a much better understanding of what it will take to build the system, how it will operate, and what benefits it can deliver. It is appropriate to reassess the technical, economic, legal, operational, and schedule feasibility based on these new learnings

8. Prepare Draft of System Design Report

System design concludes with a formal system design report summarizing the findings of this phase of the project. Any changes from the system analysis findings are highlighted and explained. The table of contents for a typical system design report. This report is a more complete and detailed version of the system investigation report.

9. Review Results of System Design with Steering Team

The system design report is presented to the project steering team with a recommendation to stop, revise, or go forward with the system development project. The steering team carefully reviews the recommendations because if the project is to proceed, considerable human and financial resources will be committed and legally binding vendor contracts will be signed. Following the steering team meeting, the project team incorporates the recommendations and changes suggested into the final report.