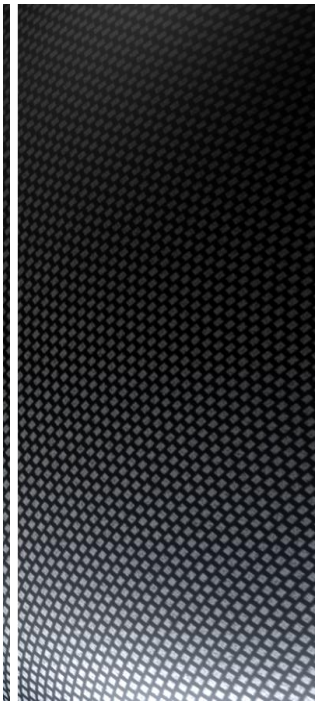
MIS
(Management Information System)

Sharif University of Technology

Session # 9

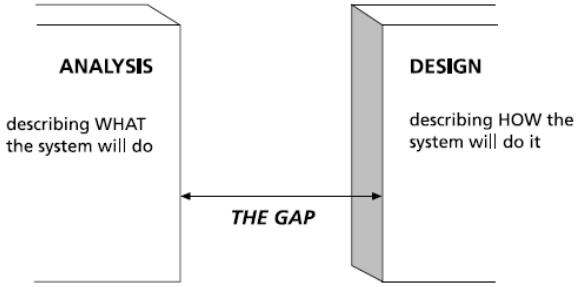


Session schedule

- *Contents*
  - *Systems Analysis and Design*

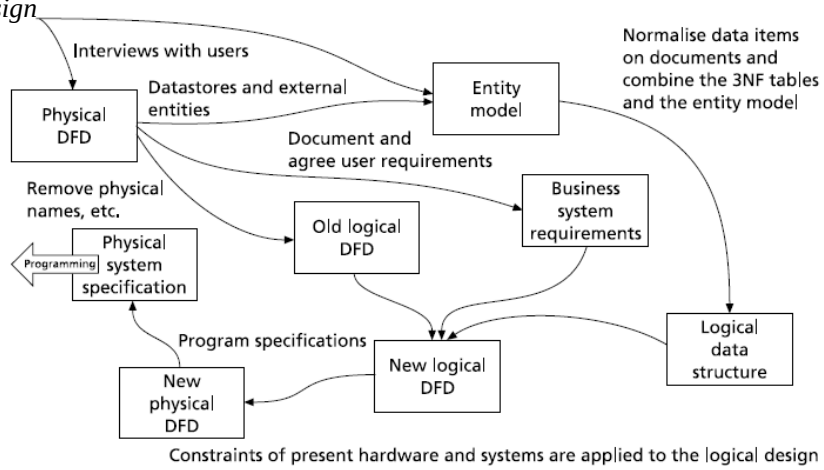
Information system development

- *System Design*
  - *From Analysis to Design*
    - *The final deliverable from systems analysis is a document containing an unambiguous statement of the client's requirements for a new system.* → *functional specification*
    - *The functional specification is the starting point for the designer*
    - *Analysis ends with a description of what the new system must do, whereas design must specify how this will be done by selecting one of the many possible ways of doing it.*



Information system development

- *System Design*
  - *From Analysis to Design*



Information system development

- *System Design*
  - *Design objectives*
    - *Flexible. The design should enable future requirements of the business to be incorporated without too much difficulty.*
    - *Maintainable. This is closely linked to the previous objective because it is about change. A good design is easy to maintain, and this reduces the system's maintenance costs, which usually represent a high proportion of the total lifetime cost of the system.*
    - *Portable. Still on the subject of change, a software system may have to run on new hardware.*
    - *Easy to use. With the increasing exposure of people to computer applications in the home as well as in the office, expectations of computer systems in terms of their ease of use are also increasing.*
    - *Reliable. This objective is about designing systems that are secure against human error, deliberate misuse or machine failure, and in which data will be stored without corruption.*
    - *Secure*. Security is another objective that must be considered by the designer.
    - *Cost-effective. This includes a number of the other objectives, and is about designing a system that delivers the required functionality, ease of use, reliability, security, etc., to the client in the most cost-effective way.*

Information system development

- *System Design*
  - *Design Constraints*
    - *Resources. An important constraint on any design solution will be the availability of resources to be used in delivering a solution to the client.*
    - *The client's existing systems. A major constraint would be the need for a new system to interface with other systems – hardware, software or manual – that already exist and will continue to be used by the client organization.*
    - *Procedures and methods. The final design might also be constrained by internal or external procedures, methods or standards.*
    - *Knowledge and skills. This might be an internally or externally imposed constraint.*

Information system development

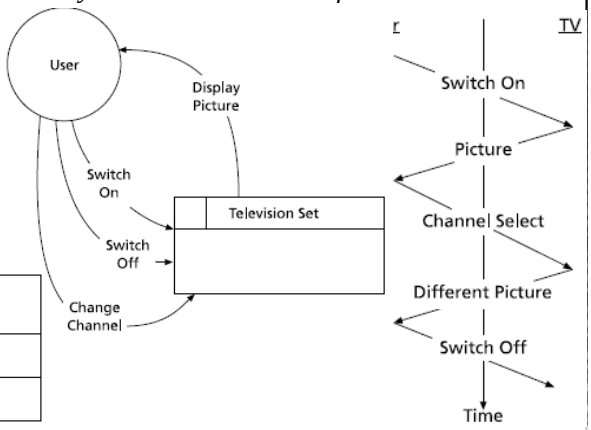
- *System Design*
  - *Information Security*
  - *Human–Computer Interaction*
  - *System Interfaces*
  - *Logical Data Design*
  - *Files*
  - *Data base design*
  - *Physical Data Design*
  - *Data Communications*

Information system development

- *System Design -System Interfaces*
  - *The design of the user interface is a key element in delivering a system that users like to use, and which enables them to operate efficiently.*
  - *There are three ways in which we can divide the systems into well-defined subsystems, and the mechanisms that might be used to implement an interface:*
    - *partitioning by organization,*
    - *partitioning by data flows, and*
    - *partitioning by data ownership.*

Information system development

- *System Design -System Interfaces*
  - *There are three diagramming methods that are widely used to describe interfaces:*
    - *State transition diagrams;*
    - *Time sequence diagrams;*
    - *Data flow diagrams.*



Events / States	Switch On	Switch Off	Select Channel
On	• Switch on the power • Change state to 'On'		
Off		• Switch off the power • Change state to 'Off'	• Select another programme

Information system development

- *System Design -Logical Data Design*
  - *Data is something that an organization invests in but which has value to the organization only when it is accurate and properly controlled.*
  - *Business processes change frequently, but the underlying data is relatively stable, and unless the core business of an organization changes, the data it uses will remain unchanged.*
  - *With the introduction of structured methods and database techniques, greater attention was paid to data analysis – a method that considers data in its own right, independent of processing limitations or hardware and software constraints.*

Information system development

- *System Design -Logical Data Design*
  - *The resulting data model provides a complete picture of the data used by the organization. It consists of:*
    - *data entities;*
    - *key fields for entities;*
    - *a list of attributes for each entity;*
    - *relationships between entities.*

Information system development

- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*
    - *A data entity is something about which an organization needs to hold data.*
    - *Data entities are not only tangible and concrete, such as 'person',*
      - *but may also be active such as 'accident',*
      - *conceptual such as 'job',*
      - *Permanent such as 'town', and*
      - *temporary such as 'stock item'.*
    - *Entities are always labeled in the singular: 'student', never 'students'.*

Information system development

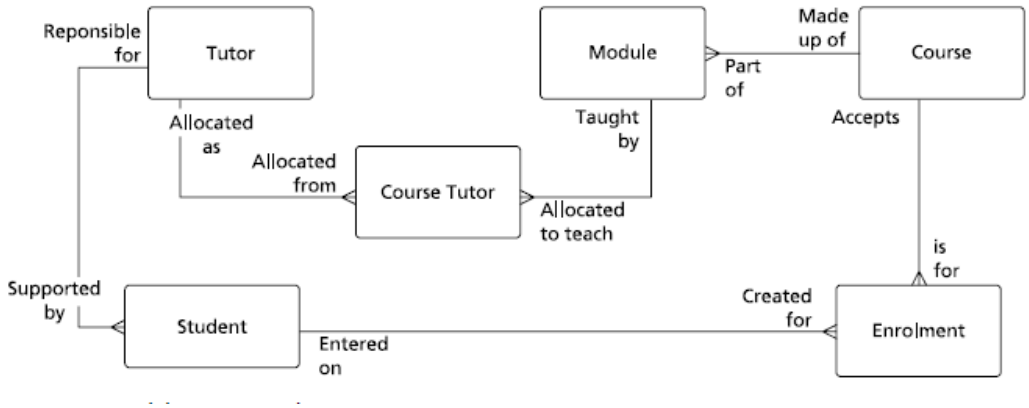
- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*
    - *An entity must have the following properties:*
      - *It is of interest to the organization.*
      - *It occurs more than once.*
      - *Each occurrence is uniquely identifiable.*
      - *There is data to be held about the entity.*

Information system development

- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*
    - *Entities have attributes.*
    - *An attribute is a data item that belongs to a data entity.*
    - *For example,*
      - *a bank may have a data entity 'customer',*
      - *which could include the attributes 'account number', 'type', 'name', 'address', 'phone number', 'account balance', 'overdraft limit'*
    - *An entity must have a key that gives each occurrence of the entity a unique reference.*
    - *There are three possible relationships between entities: one-to-one, onet o- many and many-to-many. Only one-to-many relationships are modeled on a data structure.*

Information system development

- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*



Information system development

- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*

Student	**Tutor**	**Course**
application number	tutor	course code
name	tutor name	course title
address	address	course cost
telephone number	telephone number	
tutor	grade	
year of entry	skills area	
career intention	salary	

Information system development

- *System Design -Logical Data Design*
  - *The Top-down View: Entity Modelling*

Entities	tutor	student	enro|ment	course	course tutor	module
tutor	x	1:m	-	-	1:m	-
student	m:1	x	1:m	-	–	-
enro|ment	-	m:1	x	m:1	–	-
course	-	-	1:m	x	1:m	1:m
course tutor	m:1	-	-	m:1	x	-
module	-	-	-	m:1	–	x

Information system development

- *System Design -Logical Data Design*
  - *The Bottom-up View: Third Normal Form Analysis*
    - *Normalization of data is a process of removing duplication, and grouping related data to minimize interdependence between data groups*
    - *To take data through third normal form analysis, you first need access to all data the organization stores in the system..*
    - *The analyst must then identify how these data items relate to each other. Unlike entity modelling, third normal form analysis is a procedural method of modelling the data.*

Information system development

- *System Design -Logical Data Design*
  - *The Bottom-up View: Third Normal Form Analysis*
    - *Identify all system inputs and outputs.*
    - *For each of these:*
      - *List all data items and identify a unique key (unnormalised form).*
      - *Remove repeating groups (first normal form).*
      - *Remove part-key dependences (second normal form).*
      - *Remove inter-data dependences (third normal form).*
      - *Label the relation.*
    - *Merge entities with the same key.*
    - *Apply third normal form tests.*
    - *Draw a logical data model showing the relationships between entities.*

Student Enrolment Form

Name ..... Tutor ..... Year of Entry ..... Application No. .....
Address: ..... Tutor Dept .....
.....
.....
Telephone .....

GCSE Results	
Subject	Grade
GCSE results validated Signed ..... Tutor	

Enrolment: Examined Courses				
Course Code	Course Title	Module Code	Module Title	Course Cost
			Total Cost:	

Gareer Intention

Payment Method: V ☐ A ☐ CH ☐ INST ☐
AMOUNT OUTSTANDING: .....

UNF *Select a key for the document and list all the items*	**INF** *Separate the items that repeat into their own tables with compound/composite keys*	**2NF** *Create separate tables for items uniquely identified by part of a key only*	**3NF** *Create separate tables for items dependent on non-key items*
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UNF *Select a key for the document and list all the items*	1NF *Separate the items that repeat into their own tables with compound/composite keys*	2NF *Create separate tables for items uniquely identified by part of a key only*	3NF *Create separate tables for items dependent on non-key items*
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Information system development

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  - *The Bottom-up View: Third Normal Form Analysis*
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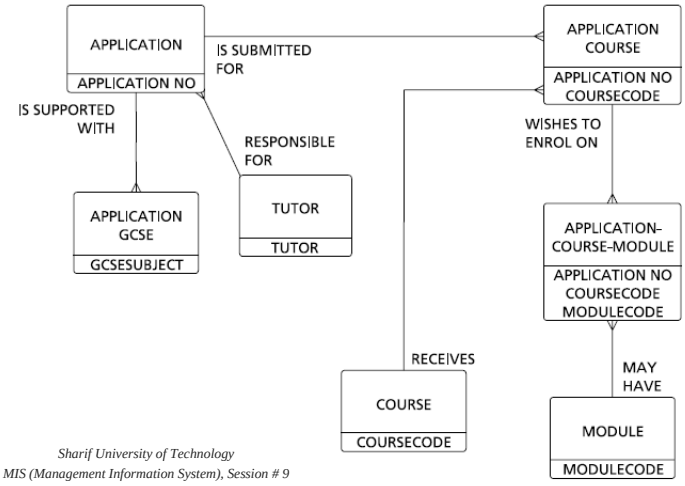

Information system development

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