

Lecture 1

System Analysis



CSE 3223



Reference Book

Text/ Reference books:

- System Analysis & Design by Kenneth E. Kendall & Julie E. Kendall (9th Edition)
- Software Engineering – A Practitioner's Approach by Roger S. Pressman, Ph.D.

Course Outline - Information System Design

- Information System Design Information and System;
- Systems Analysis and Systems Analyst;
- Information gathering techniques;
- Structured analysis of systems;
- Feasibility Study: Concepts (abstraction, refinement, modularity and hierarchy) and classification,
- Introduction to modeling language (Use case diagram, Sequence diagram and Activity diagram),
- Cost benefit analysis;
- Project scheduling;
- System design techniques;
- User interface design.

Course Outline - Software Engineering

- Introduction to system engineering and software engineering;
- Software requirements analysis, modeling and specification;
- Software Designing: principles, models, design patterns and specification; Software testing: objectives and principles, testability, testing design and implementation models and documentations, verification, validation and debugging;
- Quality factors and metrics for different software engineering phases; Software project management issues.

Terminologies

| | <i>Data</i> | <i>Information</i> |
|----------------|--|--|
| <i>Meaning</i> | Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized. | When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information. |
| <i>Example</i> | Each student's test score is one piece of data. | The average score of a class or of the entire school is information that can be derived from the given data. |

Systems vs Software

- Systems, or Information Systems, is a common term that organizations use for software.
- Technically speaking, a system is software that provides services to other software.
- The term system is often used to denote the complexity of software that is commonly used by organizations.
- A system is a general set of parts, steps, or components that are connected to form a more complex whole.
- For example, a computer system contains processors, memory, electrical pathways, a power supply, etc. For a very different example, a business is a system made up of methods, procedures, and routines.

Systems vs Software

- Software is a generic term for any computer code.
- This includes relatively simplistic software such as mobile device apps that might be written by a single developer up to the most complex systems implemented by organizations and governments.
- Software is: (1) instructions (computer programs) that when executed provide desired features, function, and performance; (2) data structures that enable the programs to adequately manipulate information and (3) documentation that describes the operation and use of the programs.

What is the difference between software engineering and computer science?

- Software engineering is an engineering discipline that is concerned with all aspects of software production.
- Software engineers should adopt a systematic and organised approach to their work and use appropriate tools and techniques depending on the problem to be solved, the development constraints and the resources available.
- Computer science is concerned with theory and fundamentals; software engineering is concerned with the practicalities of developing and delivering useful software.
- Computer science theories are still insufficient to act as a complete underpinning for software engineering (unlike e.g. physics and electrical engineering).

Software Engineer vs System Engineer

Software Engineer -

- Works on any task that requires the design and development of software. They are not restricted to front-end (web) technologies. The work can be in front-end (web) or back-end (server) environments, or on applications written for the desktop or for mobile devices.
- SWEs generally perform complex design and coding tasks. They program using whichever technology is appropriate, which may range from scripting languages (e.g. python, ruby, etc.) to higher-level languages (e.g. C++, Java, Objective C, etc.).

Software Engineer vs System Engineer

Systems Engineer -

- Works on systems in a more holistic way across multiple technologies (including software, hardware, and human processes). They are usually concerned with larger issues in the design and creation of systems, such as requirements, reliability, performance, maintenance, verification, quality, process, logistics, etc.
- A systems engineer will usually have a degree in an engineering discipline.

System analysis and System Analyst

- Systems analysis is the practice of planning, designing and maintaining software systems.
- Systems analysis is a problem-solving method that involves looking at the wider system, breaking apart the parts, and figuring out how it works in order to achieve a particular goal.
- Need for system analysis and design. These include learning to use systems that somebody else created, for planning new systems, and reducing errors when problem solving.

System analysis and System Analyst

Roles of the *systems analyst*

The analyst must be able to work with people of all descriptions and be experienced in working with computers.

Three primary roles:

- Consultant
- Supporting Expert
- Agent of change

Types of system

a) Operational Level

i) Transaction Processing System (TPS)

- Process large amounts of data for routine business transactions
- Support the day-to-day operations of the company

Examples : Payroll Processing, Inventory Management

Inventory Management: Inventory management software is a software system for tracking inventory levels, orders, sales and deliveries. It can also be used in the manufacturing industry to create a work order, bill of materials and other production-related documents.

Types of system

b) Knowledge Level

i) Office Automation System (OAS)

- Supports data workers who share information, but do not usually create new knowledge

Examples: Word processing, Spreadsheets, Desktop publishing, Electronic scheduling, Communication through voice mail, Email, Video conferencing

Knowledge Level

ii) *Knowledge Work System (KWS)*

- Supports professional workers such as scientists, engineers, and doctors

Examples : computer-aided design (CAD) systems, virtual reality systems, investment workstations

CAD (computer - aided design) software is used by architects, engineers, drafters, artists, and others to create precision drawings or technical illustrations

Virtual reality (VR) is a computer-generated scenario that simulates a realistic experience.

Investment Workstations Powerful desktop computer for financial specialists, which is optimized to access and manipulate massive amounts of financial data.

Types of system

iii) Management Information System (MIS) Support a broad spectrum of organizational tasks and including decision analysis and decision making

Examples: profit margin by sales region, expenses vs. budgets

iv) Decision Support System (DSS) Aids decision makers in the making of decisions

Examples: financial planning with what-if analysis, budgeting with modeling

v) Expert System (ES) Captures and uses the knowledge of an expert for solving a particular problem which leads to a conclusion or recommendation.

Examples: MYCIN, XCON

MYCIN

- MYCIN is the name of a decision support system developed by Stanford University in the early- to mid-seventies, built to assist physicians in the diagnosis of infectious diseases. The system (also known as an "expert system") would ask a series of questions designed to emulate the thinking of an expert in the field of infectious disease (hence the "expert-"), and from the responses to these questions give a list of possible diagnoses, with probability, as well as recommend treatment (hence the "decision support-"). The name "MYCIN" actually comes from antibiotics, many of which have the suffix "-mycin".
- MYCIN was originally developed by Edward Shortliffe for Stanford Medical School in the early-and mid-1970's. Written in Lisp, a language (a set of languages, actually) geared towards artificial intelligence, MYCIN was one of the pioneering expert systems, and was the first such system implemented for the medical field.

XCON /R1

- XCON /R1 is one of the most cited expert systems. It was developed by DEC (Digital Equipment Corporation) and was a system that ensured the customer was supplied with all the components and software that was needed to make up the specified computer system that they had ordered. This is not as easy as it sounds.
- xCon is a collaborative project by n00neimp0rtant and Lunatik that aims to be an all-in-one solution for hooking every known method and function responsible for informing an application of a jailbroken device .

Types of system

c) Strategic Level

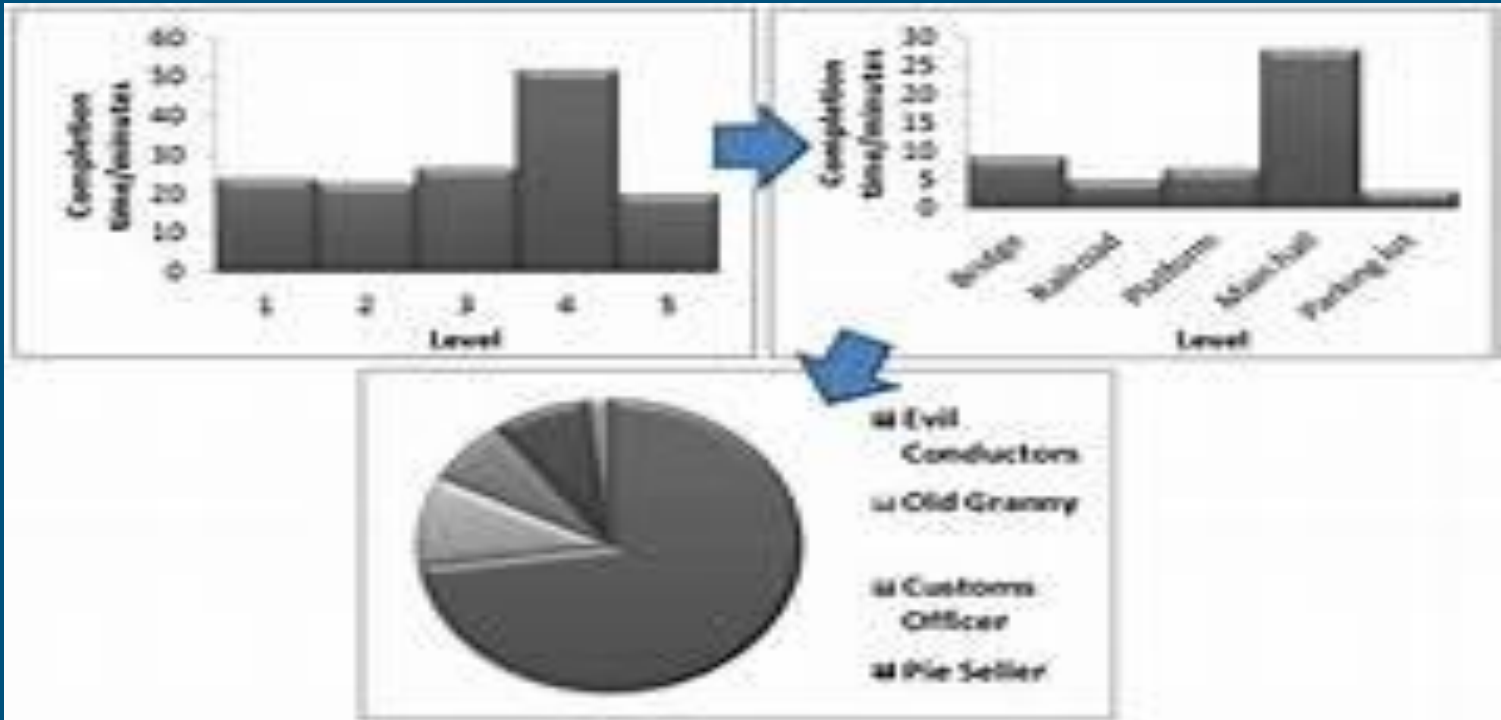
i) Executive Support System (ESS)

- Helps executives to make unstructured strategic decisions in an informed way.

Examples: drill-down analysis, status access

In *information technology* to drill down means to move from one place to another, information to detailed data by focusing in on something. In a GUI -environment, "drilling-down" may involve clicking on some representation in order to reveal more detail.

Drill-down analysis



Strategic Level

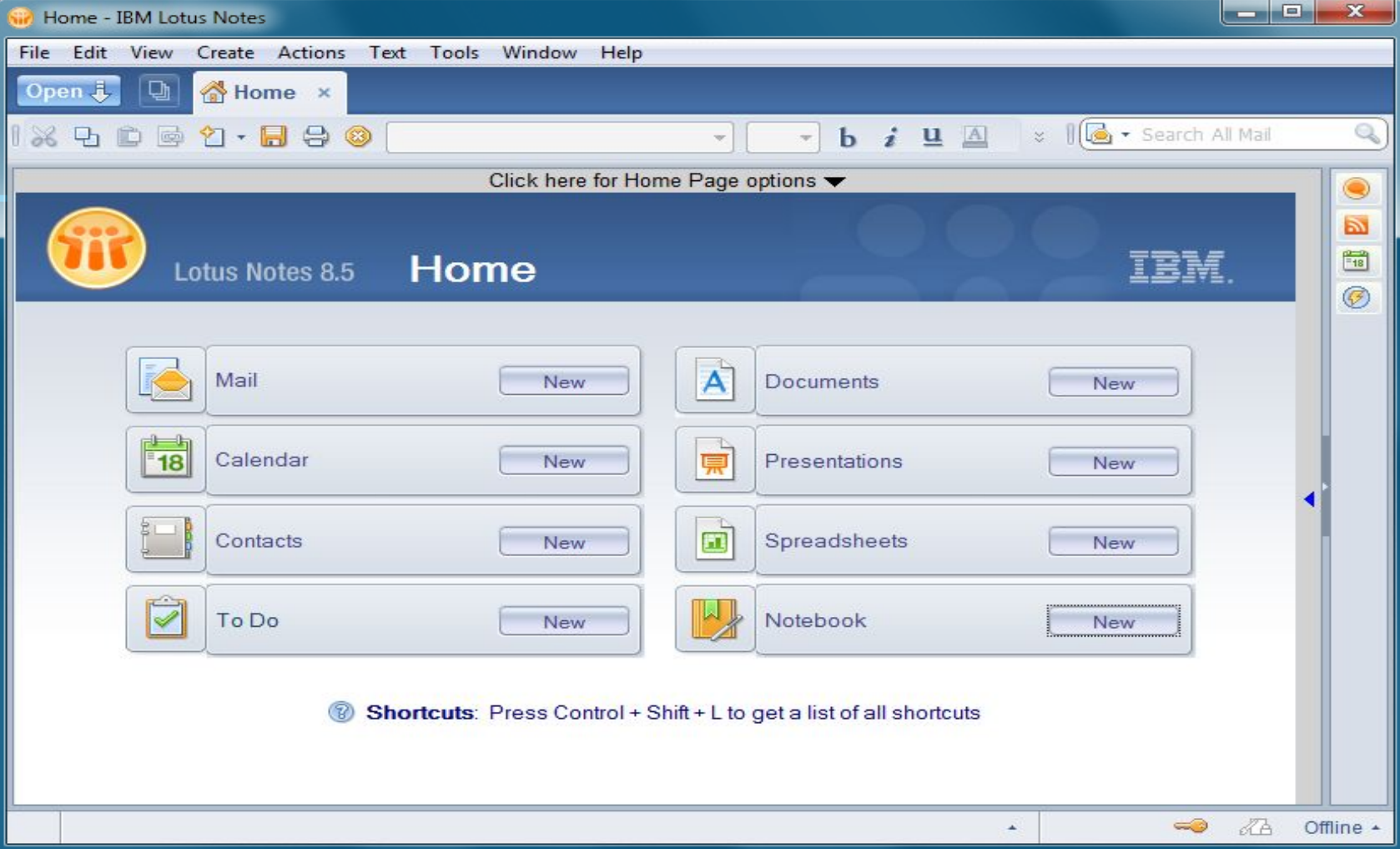
ii) Group Decision Support System (GDSS)

- Permit group members to interact with electronic support

Examples: email, Lotus Notes

Lotus Notes is a database system. In fact, most Notes environments consist of a collection of databases that might interact with each other at some level.

Lotus Notes, however, is not a relational database system. A Notes database is a collection of unstructured data, combined with various design elements that allow you to access and manipulate that data.



Strategic Level

iii) Computer-Supported Collaborative Work System (CSCWS)

- CDCWS is a more general term of GDSS.
- May include software support called “groupware” for team collaboration via network computers

Example: video conferencing, Web survey system

Integrating New Technologies into Traditional Systems

Ecommerce and Web Systems

- Increasing user awareness of the availability of a service, product, industry, person, or group.
- The possibility of 24-hour access for users
- Improving the usefulness and usability of interface design
- Creating a system that can extend globally rather than remain local, thus reaching
- people in remote locations without worry of the time zone in which they are located

Enterprise Resource Planning Systems (ERP)

- Performs integration of many information systems existing on different management levels and within different functions

Example: SAP (SAP - System Analysis Program Development. Business Suite is a packaged e-business application solutions and a variety of other applications, such as SAP CRM (Customer Relationship Management), Systems, Applications and products in data processing - added value that has a high value, which companies can merge and develop all application modules required the Company) , Oracle.

Wireless Systems

E-commerce or electronic commerce , is the process of buying and selling goods, products and services over electronic systems such as internet, telephone and e-mail.

M-Commerce or mobile commerce is process of buying and selling products and services through wireless handheld devices such as cell phones or PDAs.

What is open source software?

Open source software is software with source code that anyone can inspect, modify, and Enhance. "Source code" is the part of software that most computer users don't ever see; it's the code computer programmers can manipulate to change how a piece of software—a "program" or "application"—works. Programmers who have access to a computer program's source code can improve that program by adding features to it or fixing parts that don't always work correctly.

What's the difference between open source software and other types of software?

- Some software has source code that only the person, team, or organization who created it—and maintains exclusive control over it—can modify. People call this kind of software "proprietary" or "closed source" software.
- Only the original authors of proprietary software can legally copy, inspect, and alter that software. And in order to use proprietary software, computer users must agree (usually by signing a license displayed the first time they run this software) that they will not do anything with the software that the software's authors have not expressly permitted. Microsoft Office and Adobe Photoshop are examples of proprietary software.

What's the difference between open source software and other types of software?

- Open source software is different. Its authors make its source code available to others who would like to view that code, copy it, learn from it, alter it, or share it.
- LibreOffice and the GNU Image Manipulation Program are examples of open source software.

Lecture 2 : Systems Development Life Cycle (SDLC)

