Chapter 11

Information System Development and Programing Languages
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Chapter Objectives

- Learn the importance of project management, Feasibility assessment, documentation, and data gathering techniques(data mining)

- Learn the purpose of each system development phase

- Differentiate between high and low level programming languages

- Identify the benefits of object orientated programming languages and program development tools

- List the six program development phases

- Explain the basic control structures used is designing solutions to programming

- List other programming languages and other program development tools

- Describe various ways to develop web pages

System development

- An **Information System** is a collection of hardware, software, data,people, and procedures that work together to produce quality information.

  The five phases in a *system development life cycle* are:

  1. Planning

  2. Analysis

  3. Design

  4. Implementation

  5. Operation, Security, and Support

- The guidelines for SLDC include three general guidelines.

  1.Group activities into Phases

  2.Involve users

  3.Define standards

- **System Development** is a set of activities used to build an Information System

- **Phases** are activities grouped into larger categories related to System Development.

- **A System Development Life Cycle (SLDC)** Is a Collection of Phases for System Development. All SLDC's have **Phases**.

- **Users** are any people for whom the system is being built. This category of people can include anyone who uses the system, for example students, professors, and the SJSU administration are all users of the "My SJSU" information system.

- **Standards** are sets of rules and procedures an organization expects it's employees to follow and accept. Standards are important to help people working on the project to produce consistent results.

Participation in project development

Who participates in System Development?

It should include a representative from each party or department what may be involved with the proposed system, from users to technical staff.

- A **Systems Analyst** is responsible for designing and developing the information system, as well as acting as acting as a liaison between all involved parties, needless to say they must possess a diverse skill set, from interpersonal communication skills to problem solving abilities. sometimes they also act as programmers for the new system. Another term for a Systems Analyst is a **System Developer**.

- A **Steering Committee** is a decision making body within the Organization to which the systems analysts must report to.

- A **Project Team** consists of It professionals, Systems Analysts and users

Project Management

Project management is the process of planning, scheduling, and then controlling the activities during system development with the goal of delivering an acceptable system to the user within the agreed upon time frame.

The **Project Leader** and **Project Manager** Control the Schedule/ Budget of the project, and the activities during system development respectively.

The Following must be known the plan and schedule a project efffectivly.

- The **Scope** of the project, meaning it's goal, objectives, and expectations put upon it.

- Required Activities as well as time and cost estimates for each activity.

- The Order of activities, and knowledge of which ones can take place at the same time.

After these are identified the project leader can use **Project Management Software** to assist them in managing the project. In order to adapt to changing a project Project managers must use **Change management** to recognize changes in the project, and to react appropriately to them.

Feasibility Assessment

- **Feasibility** is how suitable a Development system would be for an Organization.

- Operational feasibility: How well the proposed system will work

- Schedule feasibility: how well does it meet deadlines

- Technical feasibility: Do we Have the technology?

- Economic feasibility: will it save more money than it costs over it's lifetime?

Documentation

- **Documentation** is any collected and summarized project information produced by employees. It must be well written, accurate, easily understandable, and through in describing the system's development process. Furthermore Up to date information must always be maintained by the Development team..

Data and Information Gathering Techniques

Several Techniques are used by Systems Analysts to gather data including:

- Review Documentation: By reviewing a variety of documentation Systems Analysts can learn about the history of a project, as well as the company's strengths and weaknesses.

- Observing people in a project lets Systems Analysts learn how accomplish their tasks.

- Surveys can be be used to collect information from many people

- Interviews are the most important information gathering technique for systems analysts as they allow them to get face to face feedback, and to ask face to face questions.

- **Joint Application Design Sessions** (**JAD** sessions, or alternately **Focus Groups**) are lengthy structured geoup meetings where IT professionals work together to design or develop an application.

- Research: There are many excellent sources of information available on the latest technology, hardware, or know-how that Systems Analysts use as research material to assist with System Development.

What initiates system development?

What initiates system development?

- **Old System is:**

- **Broken**

- **Obsolete**

- **Inefficient**

- **Insecure / security has been compromised**

- **As a result Higher Ups file a:**

- **Project Request is a request for a new or modified information system.**

- Planning Phase

  Four Activities are performed

  1. Review and Approval for Project Requests

  2. Prioritize project requests

  3. Allocate of resources to approved projects

  4. Formation of project development teams for each approved project.

- Highest priority projects are those mandated by management

Analysis Phase

- **Preliminary investigation** "feasibility study"

- written by the System Analyst

- **Detailed analysis**

  1. studying of how the current system works.

  2. determining of the user's wants needs and interests.

  3. Recommending a solution.

- System proposal

  A **System proposal** assesses the feasibility of each alternative proposal to ultimately recommend the most feasible solution for the project to the steering committee.

- **Packaged Software** is mass-produced copyrighted software which may be cross industry orientated horizontal software, or specialized vertical software.

- **Custom software** is developed if packaged software can't meet the organization's needs. Can either developed in-house or **outsourced** to a different IT firm for development.

Design Phase

Phase one

Acquiring necessary hardware and software consists of four tasks.

1. Identify technical specifications

e-zines or **electronic magazines** can provide much useful info for finding hardware and software.

2. Solicit Vendor Proposals

Through a **VAR (Value Added Reseller)** or through an **IT Consultant** or specialist.

3. Test and Evaluate Vendor Proposals

Benchmark testing is used to measure the performance of the hardware or software.

4. Make a Decision

Phase two

Develop all details of new or modified information system

- System and Database analysts work closely together to determine user access privileges

- Systems analysts design menus and outputs and submit mock ups for user approval. Formats are determined

- The program Specs are prepared

Prototyping and **CASE(computer aided software engineering)** Tools are used.

- Project submitted for Quality Review.

Implementation phase

- Develop programs

- Train users

- Convert to new system

  - **Direct Conversion**: The old system is switched out for the new one on a particular date.

  - **Parallel Conversion**: both systems are run side by side for a time.

  - **Phased Conversion:** The old system is changed out for the new one in phases instead of all at once

  - **Pilot Conversion:** Only one location in the organization uses the new system. After the pilot site approves the new system the other sites convert.

Operation support and security phase

- ## Preform maintenance activities

  Includes fixing Errors and improving the system's operations.

- ## Monitor system performance

  To determine this systems analysts meet with users to see if the system meets the user's expectations. This is also done to Monitor the system for errors or instabilities.

- ## Assess system security

  the **CSO (chief security officer)** is responsible for the System and staff's information and physical security. He must develop a **Computer Security Plan** which summarizes all the safeguards that are in place to protect the organization's information assets.

Programming languages and development tools

Computer program: A series of instructions that a computer performs.

Computer Programmer: also called a developer creates and modifies computer programs

Programming language: is a set of words abbreviations or symbols the allot a programmer to communicate with a computer.

Program Development tool: A program that provides a user friendly environment for building programs.

Low-level Languages

Both are difficult to learn.

Machine Language: First generation of programing languages, only language that computer directly recognizes.

Assembly Language: Second generation of computer languages, allows programmer to write instructions using symbolic instruction codes. Must be converted into machine language before it can run.

Source Program: Contains the language instructions or code to be converted into machine language. To convert the assembly language source program into machine language, a programmer must use a program called an assembler

Procedural languages

Procedural language: a language in which the programmer writes the computer instructions on what to do and how to accomplish it. Often called a **3GL(Third Generation Language)** uses a series of English like words and arithmetic symbols which simplifies program writing.

Compiler: A program that Converts the entire source program into machine language.

- An Interpreter reads a code statement and turns it into one or more machine code languages, then executes those machine code instructions.
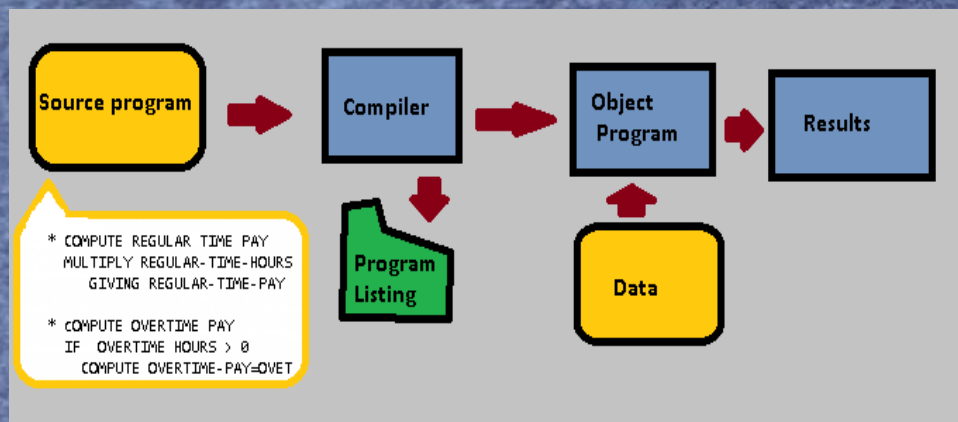
- **COBOL COmmon Business Orientated Language** a programming language designed in the early 60's for business applications/ It's English like statements made it easier to program in.
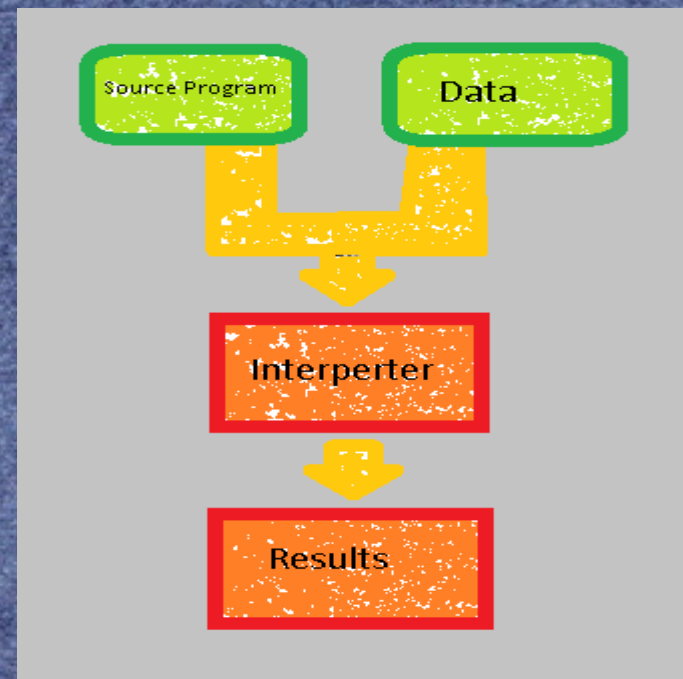
Object -Orientated – Languages and program development tools

- **Object Orientated Programming(OOP) Language:** Object oriented program development tool to implement objects in a program. An object is an item that contain both data and the procedures to .that read or manipulate that data. An Object represents a real person Place event or transaction. allows programmers to reuse existing objects. Java, C++ C# and Visual Basic are all OOP languages.

- **RAD rapid application development.** A method of developing software where a programmer writes and implements a program in segments instead of waiting until the entire program is complete.

- **IDE: Integrated Development Enviroment** Includes tools for developing graphical interfaces, editing code, debugging code, and to compile or interpret code.

Java is an OOP language by sun Microsystems that uses a JIT(Just In Time) compiler to convert machine independent code into machine dependent code that is executed immediately.

.NET The Microsoft .NET Framework is a set of technologies which allows a business to run almost any type of program on almost any device from almost any network.

C++ an OOP language based on C which is commonly used to develop database and web applications.

C# Based on C++ was developed for XML based Web Services, is seen as Competition for Java.

Visual studio

- **Visual Studio:** is Microsoft's suit of programmers in building programs for windows. Includes tools for .NET, RAT tools, and IDE.

- **Code Snippets:** Prewritten code templates associated with common programming tasks.

- **Visual Programming languages**: uses a visual or graphic interface for creating all source code.

- **VPE(Visual Programming Environment)** The graphical interface for a visual programming language.

  Delphi: is used for building large scale web based applications in a RAD environment

  Powerbuilder: Another RAD based tool created by sybase that is well suited to .NET based applications.

Other programming languages and development tools

- **4Gl: 4ᵗʰ generation programming language!** a non procedural programming language. That uses english like instructions and or acts with a graphical environment to retrieve data from files.

- **SLQ:** a popular 4GL that allows users to update, retrieve, and manage data in a traditional DSB

More Programing languages and Development tools

- **Classic programming languages**

- **Ada:** Derived from pascal, Developed bu the US DoD.

- **AGOL ALGOrithmic Language,** the first structured procedural Language.

- **APL** A programming language, a scientific language designed to manipulate tables of numbers

- **PILOT** Programmed Inquiry Learning Or Teaching , used to write computer aided instruction programs

- **BASIC** Beginners All-purpose Symbolic Instruction Code

- **PL/1** Programming Language One, a business and scientific language that combines many eatures of F

- ORTRAN and COBOL

- **Forth** Similar to C , used for small computerized device**s.**

- **LISP** LISt Processing, a language used for AI

- **Logo** An educational tool used to teach programming and problem solving to children

- **Modula-2** A successor to pascal used for developing system software

- **Pascal** Developed to teach students structured programming concepts..

- **Prolog PROgramming LOGic**

- **FORTRAN** FORula TRANslator: one of the world's first High Level Programming Languages used for scientific applications

- **RPG Report Program Generator** used to assist businesses with generating reports and to access/update databases.

- **Hypertalk** An Object Orentate programming language developed by apple to manipulate cards that can contain text, graphics, and sound.

- Smalltalk: OOP programming language.

- **Application Generator:** Is a Program that creates source code or Machine Code for a specific application. Consists of a report writer, form, and menu generator.

A **Macro** is a series of statements that instructs a program how to complete a task. Is usually created in one of two ways, Recording the Macro, or Writing the Macro. Macros are good for doing repetive tasks, however they can pose a security threat.

Web Page Development

- ## HTML and XHTML

  HTML: HyperText Markup Language

  Is a special formatting language that programmers use to format documents for display on the web.

  - **eXtensible HTML:** Is a special formatting language that allows websites to be displayed more easily on microbrowsers, in smart phones.

  HTML and XHTML are not actually programming languages, however they do have constraints and rules, as well as they use symbolic code.

- ## XML and WML

  are markup languages that allow developers to design pages specifically for microbrowsers, WML(Wireless Markup Language) is designed specifically for smartphones.

  - **RSS2.0: Really Simple Syndication**, a format that confirms to **ATOM** standards which publishers use to distribute content to users through a web feed.

Scipts and Applets.

- **Scripts and applet controls**

  these programs run inside other programs and are used to add multimedia effects to web pages. They are not executed in the operating system.

- Scripting Languages

- Is an interpreted language that is typically easy to learn and use. Popular scripting languages include: JavaScript, Pearl, PHP, Rexx, Tcl, and VBSScript.

- **Javascript** is an an interpereted language that allows programmers to add dynamic content to a webpage.

- **Pearl(Practice Extraction and Report Language)**was developed by NASA, and is similar to C and C++.

- **PHP: Hypertext Preprocessor,is a freeopen source scripting language similar to JAVA and Pearl.**

- **Rexx(Restructured Extended eXecutor) is a subset of Visual Basic language that Allows procedural interpreted scrpting language for professionals,programmers, and nontechnical users.**

- **VB script: Visual Basic Script**

- **Dynamic HTM**L

  Is an new type of HTML that allows webpages to be more interactive.

- **Web 2.0**

  Web2.0 sites Often use **Ajax** (Asynchronous Java Script) and XML as a method of creating interactive web pages

- **Ruby on Rails**

- Is an Open Source Framework that provides technologies for developing object oriented database driven sites.

- Web Page authoring software&multimedia

- **Dreamweaver**

- **Expression Web**

- **Flash**

- **SharePoint Designerc**

Website Design Doftware

- **Dreamweaver:** made by adobe systems allows a web developer to construct and maintain professional websites.

- **Expression Web:** Is Microsoft's web authoring program that enables professional, dynamic, and interactive websites. .

- **Flash: by adobe systems is a web authoring system that allows web developers to combine interactive with text with graphics, audio, and video.**

- **SharePoint Designer: is a web page authoring program that comes stock with Microsoft office.**

Program Development

- Program development life cycle proceeds through 6 steps:

  1. analyze Requirements

  2. Design Solution

  3. Validate design

  4. Implement Design

  5. Test Solution

  6. Document Solution

  Maintaining a program is when programmers fix errors.

- **What initiates program development?**

  If during implementation the analyst decides to have a program made the meat requirements.

  Programming teams consist of a group of programmers that develop programs.

Control Structures

- ## Control structure

- Depicts the logical order of program instructions.

- ## Sequence control structure

  depicts one or more actions following each other.

- ## Selection control structure

- Tells the program which action to take based on a certain set of conditions.

- **A Case Control Structure**: is when a condition can yield three or more possibilities.

Repetition control structures

- Enables a Program to perform one or more actions repeatedly as long as a certain condition is met.