# Software Development Life Cycle

# Overview

- What is SDLC and how it relates to software development
- Business Analysis
- Requirements Analysis
- Design
- Implementation

- Testing
- Deployment
- Maintenance
- Hands-On Exercise

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# Software Development Life Cycle

**Software Development Life Cycle (SDLC)** is a process used by the software industry to design, develop, and test high-quality softwares. The SDLC aims to produce a high-quality software that meets or exceeds customer expectations and reaches completion within time and cost estimates.

# Software Development Life Cycle - Phases
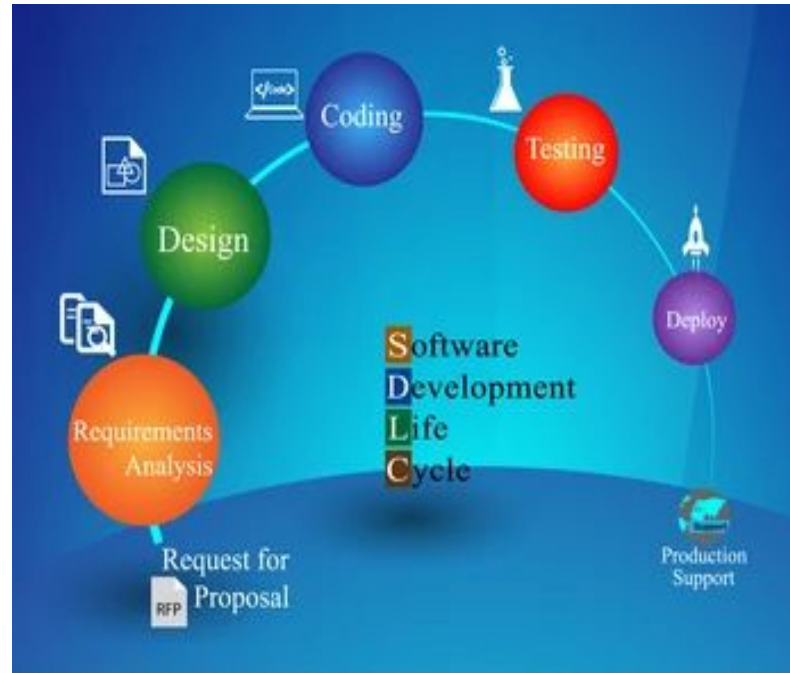
# Example: First Family Home

In order to get a clearer understanding of the SDLC, we will look at what it takes to build a first family home.

There is a great deal of planning involved.

# Stage 1A – Business Analysis

The **Business Analysis** phase (initial part of the **Requirements Analysis** phase) answers the question – **Where are we now?**

We need to understand current business processes and practices, which would help us in determining the business needs. Also, to produce a product that is not only of good quality, but fit for use.

# The Current Situation

- One bedroom apartment (we now have 2 kids).
- Limited closet space.
- High rent (more than a mortgage).
- Small kitchen (would like more space).
- One bathroom servicing 4 people.
- No parking space.
- No privacy.
- No place for kids to play.
- Too many people in neighborhood.

# Stage 1B – Requirements Analysis

The **Requirement Gathering** phase (also known as **Requirements Analysis** when including Business Analysis phase) answers the question – **What are we building?**

This is the phase where Business Analysis gathers information from the customer that describes what they want and how they want it used.

This is the MOST important stage of the SDLC. Every other phase is based on the requirements.
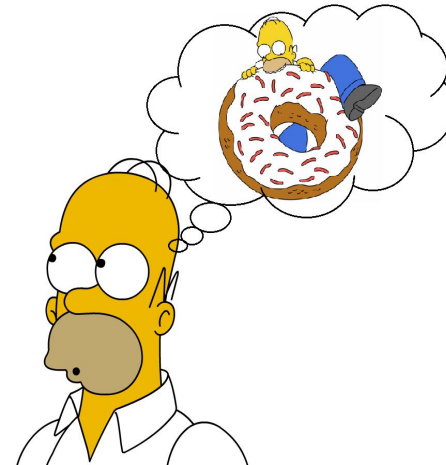
# What We Are Looking For

This is definitely not the time to think about food. We need to have a clear understanding of:

☐ What we want to have (desire to have – initial plans)?

☐ What we have to have (absolutely necessary)?

☐ What is just gravy (extra stuff – non-expected enhancements)?

We need to have a picture in mind.

# Evaluate the Picture

Now that we have a picture in mind of what we want, let's get the architect involved.

Ooops, we forgot about how much it will cost. This house price is above our budget. Let's "trim the fat" and looks for something simpler.

# A Clear Picture

We have gone through our list of requirements. We know exactly what we want, what we need, and what we can have as "gravy."

We now have a clear picture of our new home. Let's call the architect in to see what he can do.

# Stage II - Design

The **Design** phase answers the question – **How do we build it?**

This phase is key to the developer. The design is pieced together from the system analysis. There are various graphic designs used to illustrate the flow of the application. From a system perspective (security, notifications, business requirements, etc.), to a user perspective (menu's, files, editing, calculation, etc.), all flows have to be clear, so that coders can complete their work.

# Architectural Design

We only had to make minor adjustments, but the plans look great. Now it is time to build.
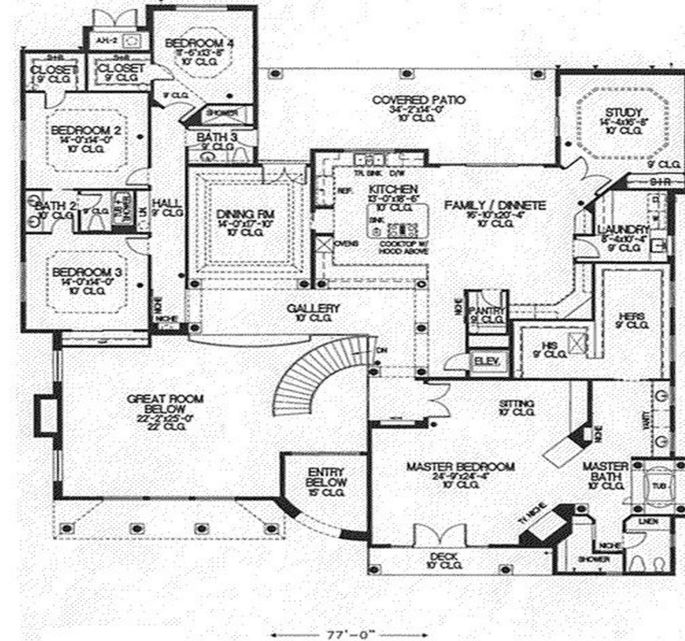
# Stage III - Development

The **Development** phase (here, referred to as the **Coding** phase) is where the action is. **Let's make it happen.**

Now that we have a clear understanding of how the application is supposed to work, it is time for our team of programming experts to begin coding.

Programming tools like compilers, interpreters, and language like C, C++, and Java etc., are used for coding with respect to the type of application. The right programming language should be chosen.

# Let's Build

During construction, we discovered a few design challenges, but the work is proceeding nicely.

Our lead contractor is on the case, making sure everything is the way we want it. He is also conferring with the inspectors to make sure the building codes are being met.

# Stage IV – Testing

The **Testing** phase answers the question – **Is the software of good quality?**

**Software Quality** is best determined by how well the software meets the requirements. There is another perspective to consider; that perspective is the user perspective.These are the people who will be using the software on a daily basis.

This is referred to **"Fit-for-use."** Here, we test the application, using organized "Manual" and/or "Automated" testing.

# Home Sweet Home!

The kids are getting excited. The husband is already making friends with the new neighbors and packing boxes. But wait! We need to have the inspection done.

Let's cross our fingers.

# Stage V – Deployment

Now that the application has been built, and it has passed testing so that it is determined to be of the highest quality, it is time to deploy. This is the purpose of the **Deployment** stage.

This stage is also referred to as the **Implementation** or **"Go Live"** stage. It is now time to see if our business analyst and programmers have earned the big bucks. The company has paid for their services.

# Time to Move!

The inspection went through like a charm, and it is time to move.

The kids are packed, and the truck is on the way.

It is time to move into our dream home. Everyone is happy.

# Stage VI – Maintenance

The **Maintenance** phase is an ongoing process.

There is no such thing as a completed application. There is always room for improvement, or something that has been overlooked. The **Maintenance** phase refers to any upgrades, fixes or improvements to the application after **Deploy**.

# Home Improvements and Repair

A home is never completed. There are always repairs to be made; and because families change, the home changes. And we are always thinking of ways to make our home more valuable by making additions.

Mowing the Lawn

Adding Kitchen Tiles

Shelving for Garage

Painting the Kid's Room

# Summary Review

❑ The SDLC is a process used to deliver quality software.

☐ Requirements Analysis – What do we want?
☐ Design – How we want it?
☐ Coding – Let's make it happen.
☐ Testing – Did we do it right?
☐ Deploy – Time to "Go Live."
☐ Maintenance – Let's make it better.

# Questions?

# Test Your Knowledge

1.  Enhancements, upgrades, and bug fixes are done during the _____ step in the SDLC?
    A.  Problem Identification
    B.  Design
    C.  Development
    D.  Maintenance
2.  The difference between High-Level Design (HLD) and Low-Level Design (LLD) is that HLD contains architectural diagrams of overall components while LLD consists of thorough descriptions and details.
    A.  True
    B.  False
3.  Determining user expectations happens during which phase of SDLC?
    A.  Design
    B.  Maintenance
    C.  Requirements Analysis
    D.  Testing

# Hands-On Exercise

**Scope:**
This exercise is to prepare students for interviewing a SME (Subject Matter Expert) in order to obtain information related to business requirements. This will be a group exercise and the following skills will be assessed:

- **Leadership qualities.**
- **Coverage of the application.**
- **Teamwork.**
- **Creativity in getting the SME to give useful requirements.**
- **Identification of functional and non-functional requirements.**

**Setup:**
**STEP 1:** The class will be broken up into groups of five. One student will act as the SME for a particular application. If necessary, the instructor will act as the SME for one of the groups if the groups are not even. The groups can choose to use Microsoft Word, Excel, or PowerPoint, but the SME can choose his or her own option.

# Hands-On Exercise (continued)

**STEP 2:** The group will come together to evaluate all of the requirements gathered by the same group, and make sure that the requirements are clear. You need to make sure that the requirements provide coverage of the application presented. One person will be designated to coordinate this process (someone other than the SME). There should be one list, which is a compilation of everyone's requirements' list in the group.

**STEP 3:** The compilation lists will be distributed among all team members (including the SME), and each member will take the list home and separate requirements into functional and non-functional requirements. This completed list will then be uploaded into the LMS for review.

**Outcome:**
The functional and non-functional lists from each student should contain a list header, which includes the student's name, application that the discussion was on, date, and who the SME was for the assignment.  This list is to be published in the LMS.

# Hands-On Exercise – Notes

❑ The exercise will be located in LMS under *Assignments*.

❑ The exercise will not be graded however, there will be notes made to the original documents.

❑ Depending on how the exercise goes, there may be more than one meeting with the SME to obtain clarity for the requirements.

❑ SME are to use an application that they are well-verse in. We do not want to be too creative here because it will make it difficult when trying to go to next phase of the SDLC process.

❑ Understand that this is only a sample of what it takes to get a requirements analysis. As the course is limited on time, the idea is to understand the concept, not to perfect the process.

# End of Module