HACETTEPE UNIVERSITY
Faculty of Engineering
Department of Geomatics Engineering

GIS Programming (GMT 456)

Introduction to Software Engineering

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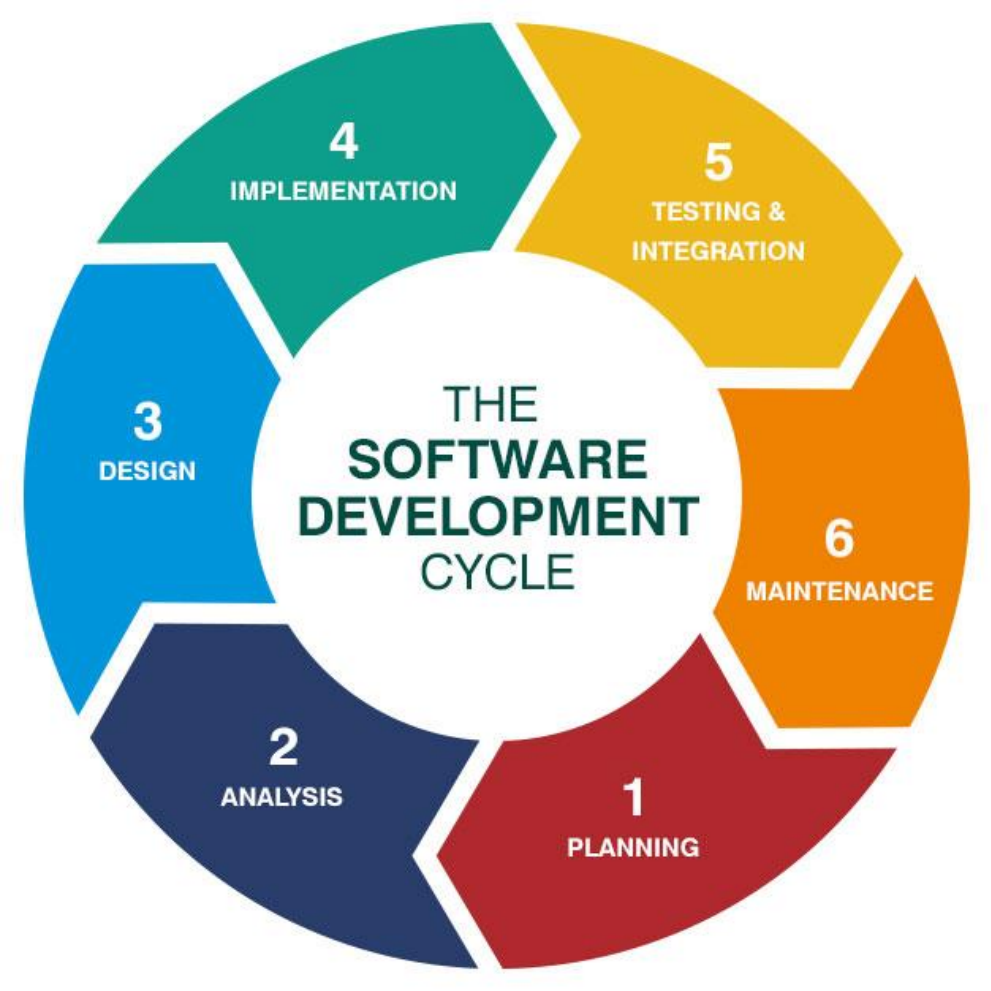
Software

- Definition
- Final?
  - When it would be final?
- Backward compatibility
- Code legibility
- Standards
  - Python – PEP8

Software Design LifeCycle (SDLC)



https://www.tutorialspoint.com/sdlc/sdlc_overview.htm

https://datarob.com/essentials-software-development-life-cycle/

Software Design LifeCycle (SDLC)

- SDLC is a blueprint designed for a team to create, maintain, and fix digital products.
- The steps of an SDLC process depend on the
  - project size and
  - project goals.
- Every development team creates its ***own SDLC***, or adopts one of the models, which we will explore further.
- Provides an ***order of tasks*** aimed at creating a digital solution.

Software Design LifeCycle (SDLC)

- SDLC provides control over the development whole process.
- Provides a
  - working plan,
  - mechanism to manage conflicts management between participants, and
  - budget plan (month/man).

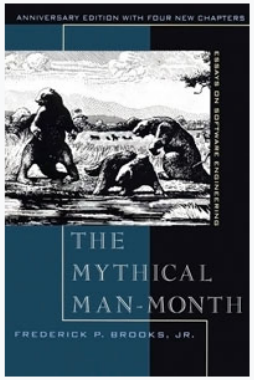
The Mythical Man-Month

From Wikipedia, the free encyclopedia

The Mythical Man-Month: Essays on Software Engineering is a book on software engineering and project management by Fred Brooks first published in 1975, with subsequent editions in 1982 and 1995. Its central theme is that "adding manpower to a late software project makes it later." This idea is known as Brooks' law, and is presented along with the second-system effect and advocacy of prototyping.

Brooks' observations are based on his experiences at IBM while managing the development of OS/360. He had added more programmers to a project falling behind schedule, a decision that he would later conclude had, counter-intuitively, delayed the project even further. He also made the mistake of asserting that one project—involved in writing an ALGOL compiler—would require six months, regardless of the number of workers involved (it required longer). The tendency for managers to repeat such errors in project development led Brooks to quip that his book is called "The Bible of Software Engineering", because "everybody quotes it, some people read it, and a few people go by it".[1] The book is widely regarded as a classic on the human elements of software engineering.[2]

The Mythical Man-Month



Author	Frederick Brooks
Subject	Software project management

1: Planning and Requirement Analysis

- Requirement analysis is the ***most important*** and ***fundamental stage*** in SDLC.
- People involved
  - Senior members of the project
  - Customers
  - Sales department
  - Market surveys
  - Domain experts
- Product feasibility study in the ***economical***, ***operational*** and ***technical areas***.
- ***Quality assurance*** & ***identification of risks***.

2: Defining Requirements

- From requirement analysis
→ to a →
written document:
Software Requirement Specification (SRS)

- Get it approved from the customer or the market analysts.
- Defines all the ***product requirements*** to be designed and developed during the project life cycle.

3: Designing the Product Architecture

- Software Requirement Specification (SRS) is the reference for product architects to come out with the ***best architecture for the product*** to be developed.
- Usually ***more than one design approach*** for the product architecture is proposed in the ***Design Document Specification (DDS)***.
- DDS is ***reviewed*** by the important stakeholders.
  - risk assessment,
  - product robustness,
  - design modularity,
  - budget and time constraints.

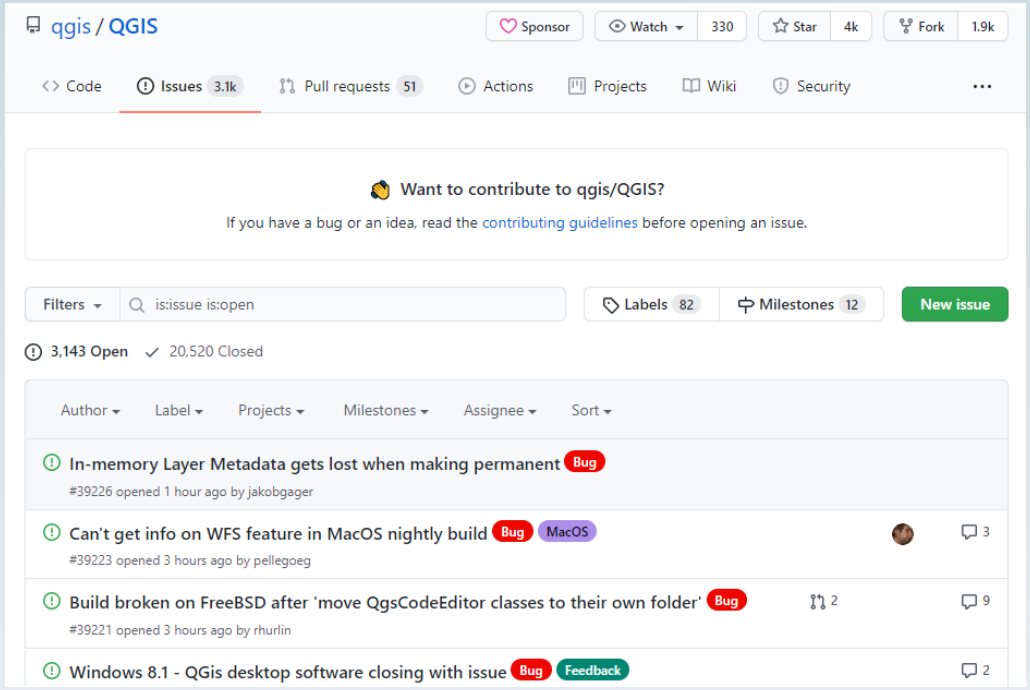
4: Implementation – Developing the Software

- The actual code implementation.
- The programming code is generated based on the Design Document Specification (DDS).
- **If** the design is performed in a detailed and organized manner,

  →code generation ***can be accomplished easily.***
- Developers **must** follow the **coding guidelines** defined by their organization and programming tools.
  - Python – PEP 8
- The programming language is chosen with respect to the type of software being developed.
  - QGIS ~ Python

5: Testing

- Usually a subset of all the stages in the modern SDLC models.
- Testing only ***stage of the product.***
- Product defects are:
  - reported,
  - tracked,
  - fixed and
  - retested.
  - until the product is in line with SRS.



6: Deployment & Maintenance

- Product is tested and ready to be deployed → it is released formally in the appropriate market.
- Sometimes product deployment happens earlier in stages as per the business strategy of that organization.
  - The product ***may first*** be released in a limited segment and tested in the real business environment (UAT- User Acceptance Testing).
  - Based on the feedback, the product may be released as it is or with suggested enhancements in the targeting market segment.
- After the product is released in the market, its maintenance is done for the existing customer base.

Collaboration

SDLC Models

- Different SDLC models exist.
- There is no ‘best’ one.
  - Tradeoffs between different models.
  - Depends on the project/team.
- Models include
  - Waterfall Model
  - Iterative Model
  - Spiral Model
  - V-Model
  - Big Bang Model
  - Agile
  - Scrum, XP, …