

Software Engineering

Software Process

- Set of related activities that leads to the production of a software product (from scratch or extending existing software)
- There are different software processes but all must include four fundamental activities:
 - Software specification
 - Software design and implementation
 - Software validation
 - Software evolution
- Very structured development process is required for critical systems
- Less formal, flexible process is more effective for business systems with rapidly changing requirements

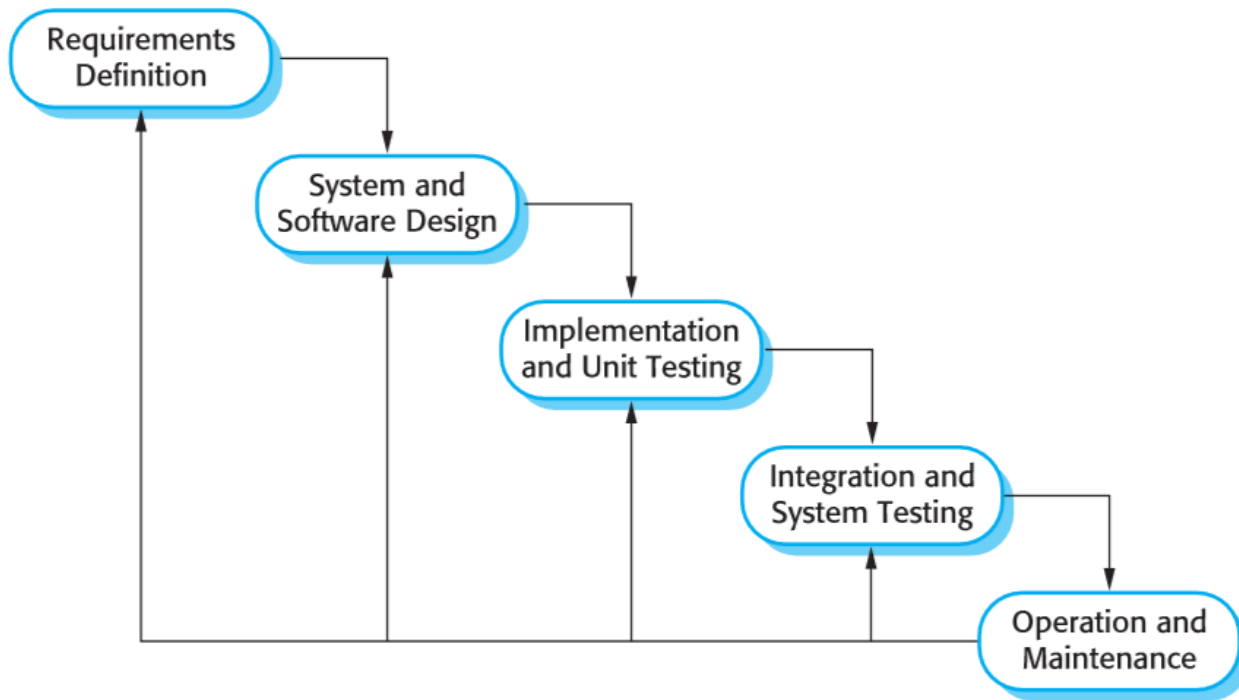
Software Process Model

- Simplified representation of a software process
- Each process model represents a process from particular perspective and thus provides only partial information about that process.
- Some generic models are:
 - Waterfall model
 - Incremental development
 - Reuse-oriented software engineering

NOTE: These models are not mutually exclusive and are often use together, specially for large system development.

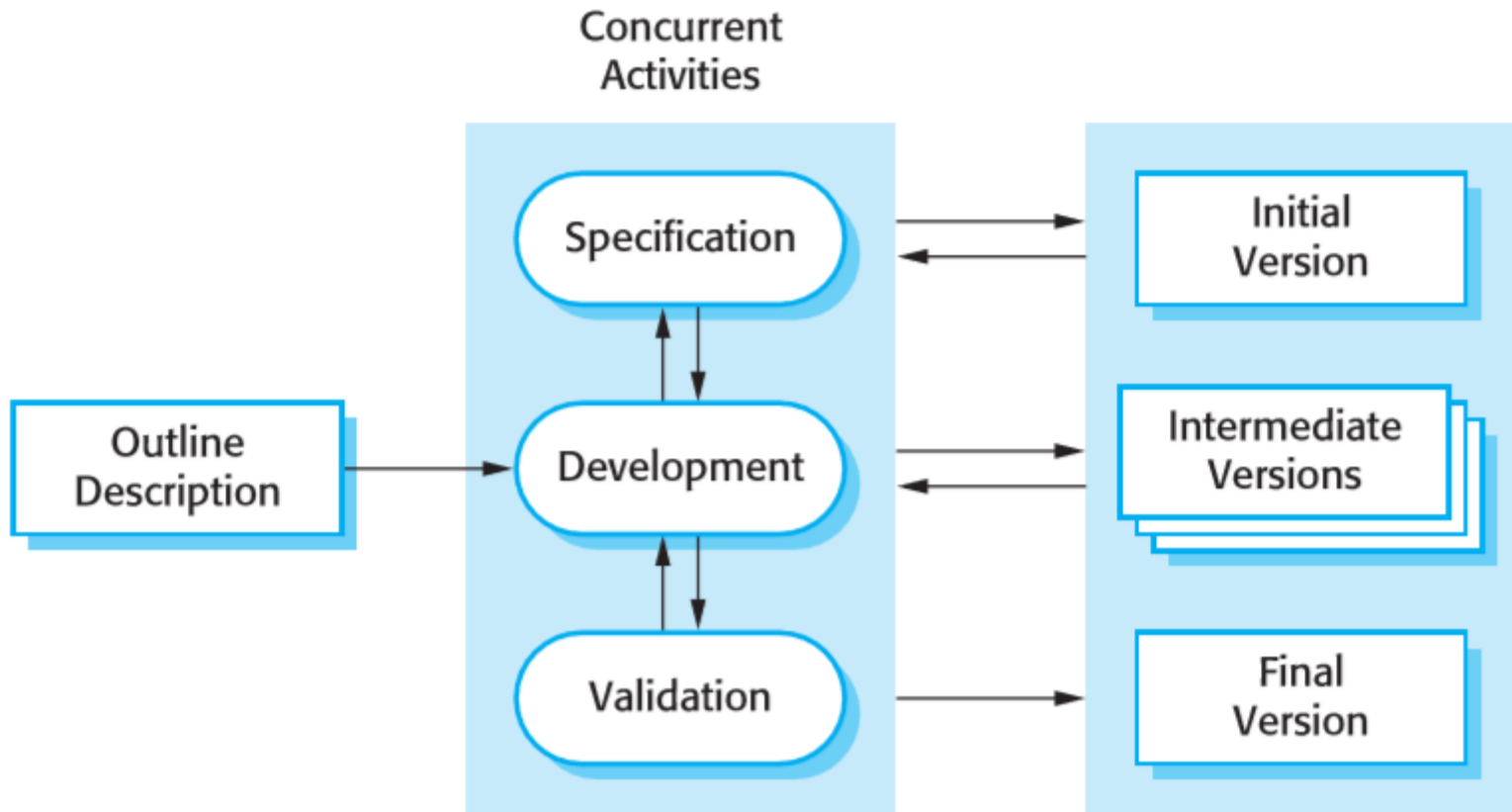
Waterfall Model

- Example of plan-driven process
- Should only be used when requirements are well understood and unlikely to change radically during system development.



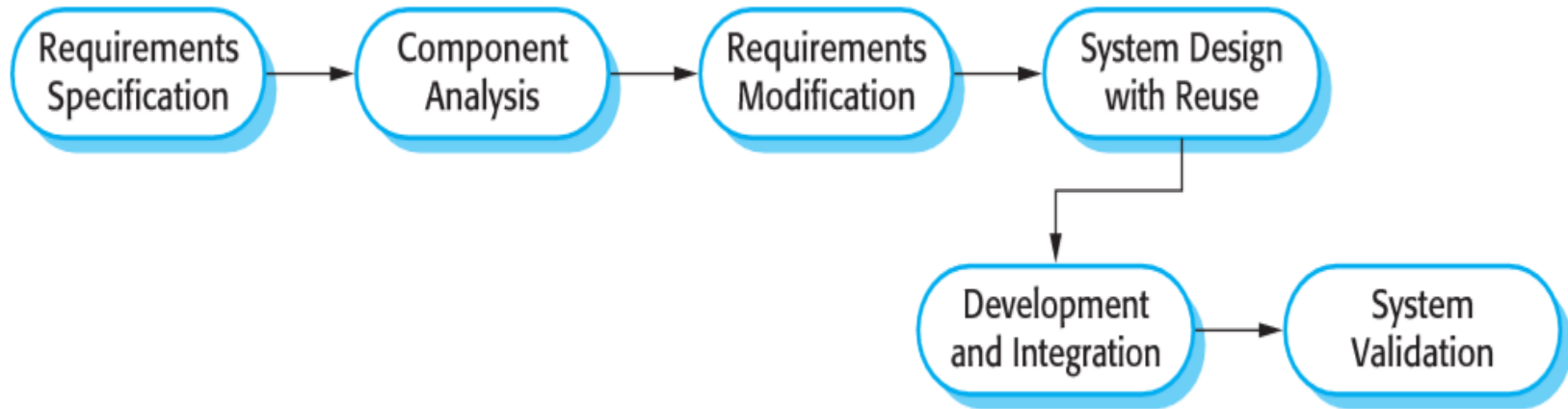
NOTE: In practice, these stages overlap and feed information to each other. Example: during design, problems with requirements are identified and during coding, design problems are found, and so on.

Incremental Development



- Benefits over waterfall model:
 - Cost of accommodating changing customer requirements is reduced
 - Easier to get customer feedback on the development work
 - Rapid delivery and deployment of useful software to the customer
- Problems with this model (from management prospective)
 - Process is not visible as systems are developed quickly and it is not cost-effective to produce documents that reflect every version of the system
 - System structure tends to degrade as new increments are added

Reuse-oriented Software Engineering



Types of software component that can be used in reuse-oriented process:

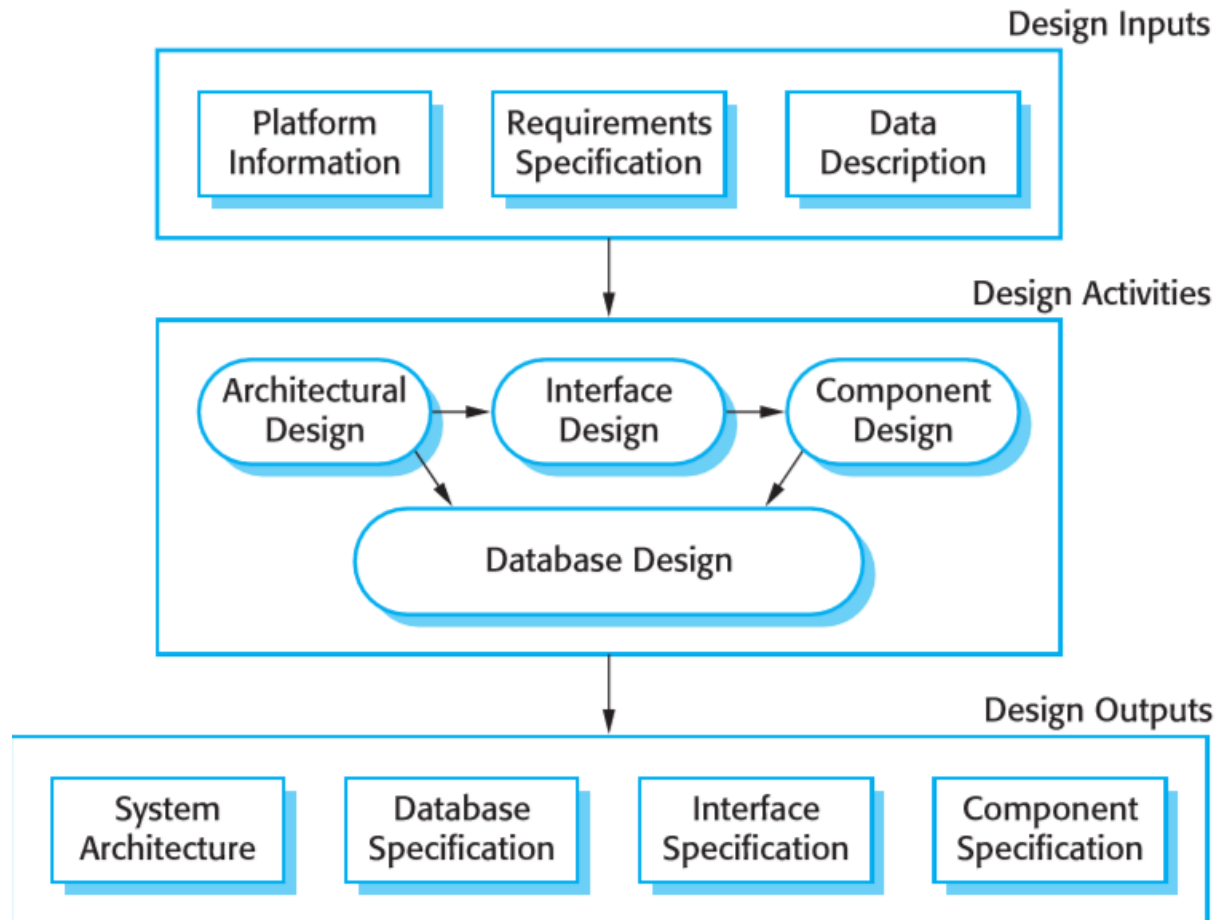
- Web services
- Collections of objects developed as a package to be integrated with a component framework such as .NET or J2EE
- Stand-alone software systems

Software Specification

- Also known as requirement engineering
- Process of understanding and defining what services are required from the system and identifying the constraints on system's operation and development.
- Four main activities involved are:
 - Feasibility study
 - Requirements elicitation and analysis
 - Requirements specification
 - Requirements validation

Software Design and Implementation

- Process of converting a system specification into an executable system.
- Safety-critical systems are usually designed in detail before any implementation begins.



To Be Continued...