# Software

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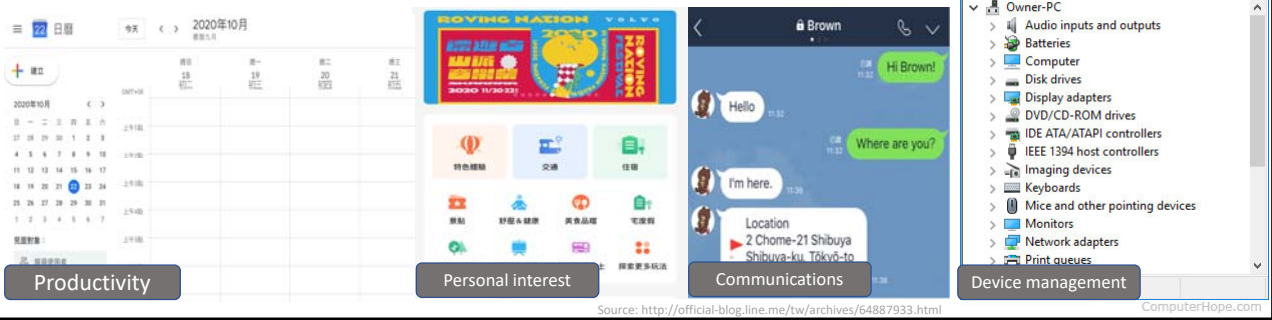
## Purpose of Apps

**Application software**: programs that can help you perform specific tasks when using a computer or device

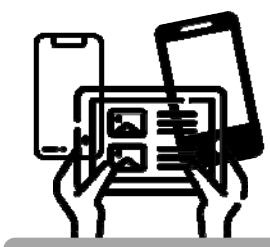
- Productivity apps: create documents for commercial or personal use
- Graphics and media apps: interact with digital media
- Personal interest apps: tools to pursue interests
- Communications apps: tools for sharing information
- Device management apps: tools to maintain a computer or device



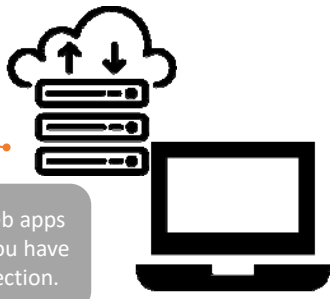
# Types of Apps

**Types of Apps**

- **Local apps**: installed and run on computer hard drive
- **Portable apps**: run from external storage (e.g., flash drive) or cloud
- **Web apps**: programs accessed through Internet via browser or mobile device
- **Mobile apps**: apps run on the mobile device (e.g., smartphone or tablet)



Mobile apps run on your smartphone or tablet.



You can access web apps anywhere when you have an Internet connection.

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You are about to develop a new program for various platforms within a limited time, which one should go first? Why?

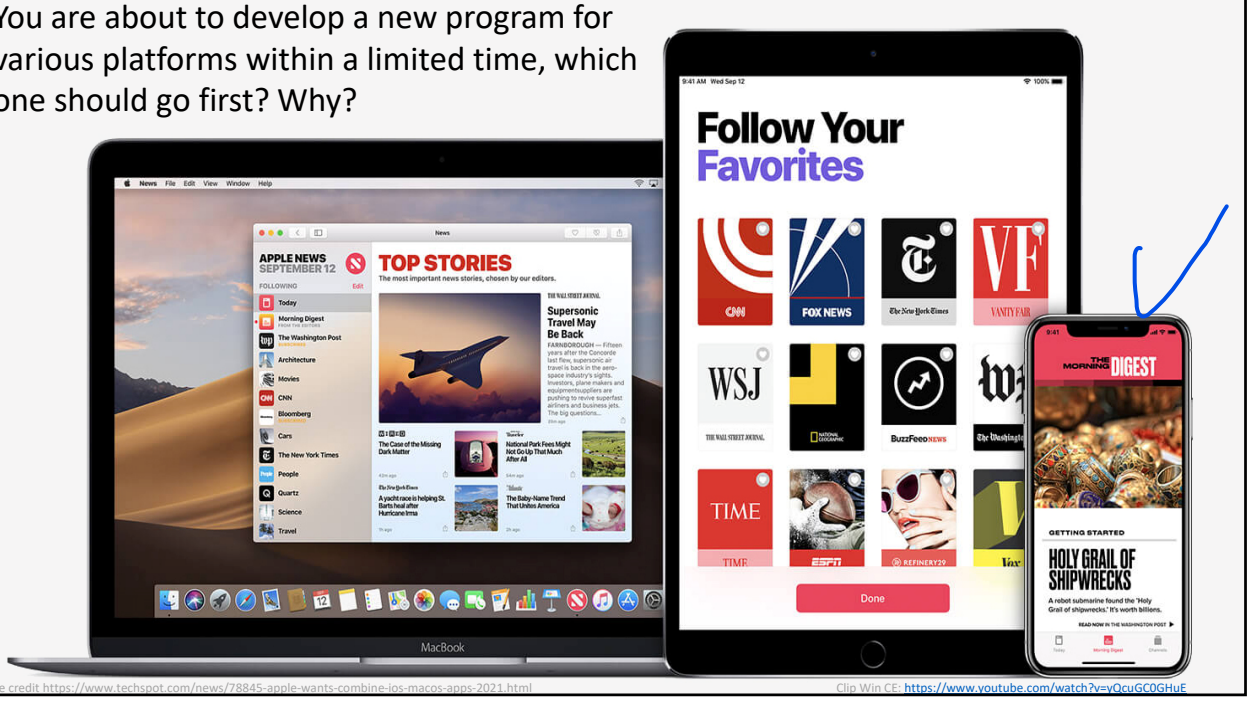


image credit https://www.techspot.com/news/78845-apple-wants-combine-ios-macos-apps-2021.html

Clip Win CE: https://www.youtube.com/watch?v=yQcuGC0GHuE

# Current Trends in App Development

**Mobile first design** (expand is easier)

- Build apps to work on mobile devices first as they come with more restrictions
  - Limited resources to deliver system services
  - Smaller screen or less computing power to enhance system functionalities
- Focus on the key elements
  - Understand the users' most important tasks
  - Quickly access key functions on a small screen
- Extend the functions of the tablet or desktop version
  - Deleting menu items vs. expanding or adding menu items
- Cross platform mobile development tools
  - Mobile commerce (m-commerce)

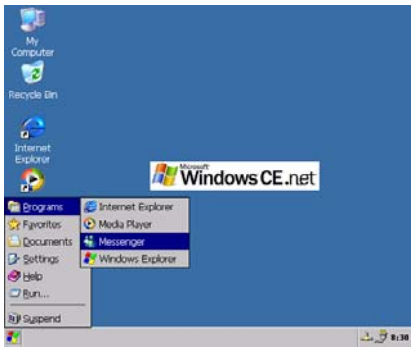


image credit: https://guidebookgallery.org/guis/windowsce/screenshots
Clip Win CE: https://www.youtube.com/watch?v=yQcuGC0GHuE

# Software Development Life Cycle (~~SLDC~~) SDLC

SLDC produces the fastest, least expensive, and highest quality products

(waterfall)

上一階段 output
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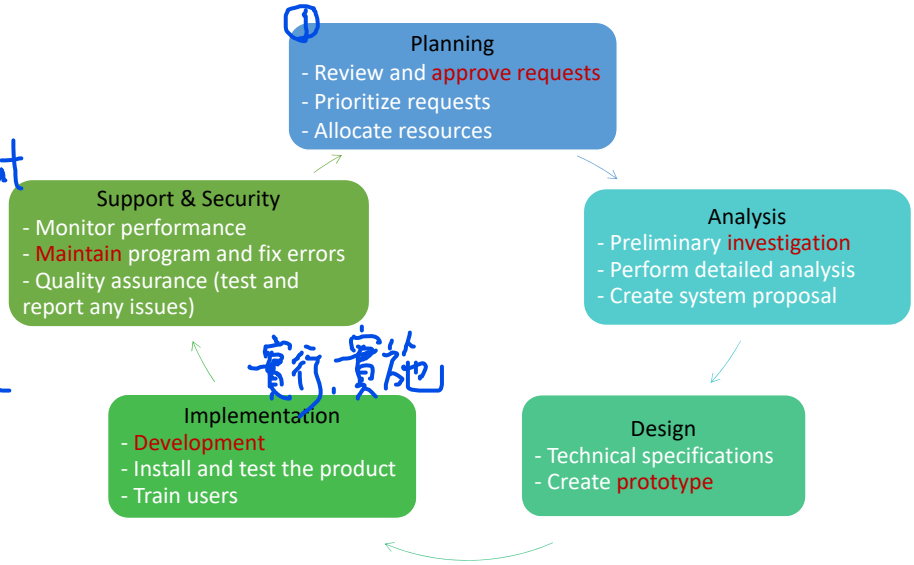
下一階段 input

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## Analysis Phase

- Determine if the project is worth pursuing
  - Operational feasibility: the operating status of the application; whether it meets user requirements
  - Schedule feasibility: project's timetable and deadline
  - Technical feasibility: the skills and resources required to complete the planned functions
  - Economic feasibility: cost/benefit analysis
- Specify what the software will do without determining how it will be done

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## Design Phase

- Determine how the system will accomplish what was defined in the analysis phase
- Obtain necessary hardware and develop the details of the finished product (prototype)
  - All system components need to be defined

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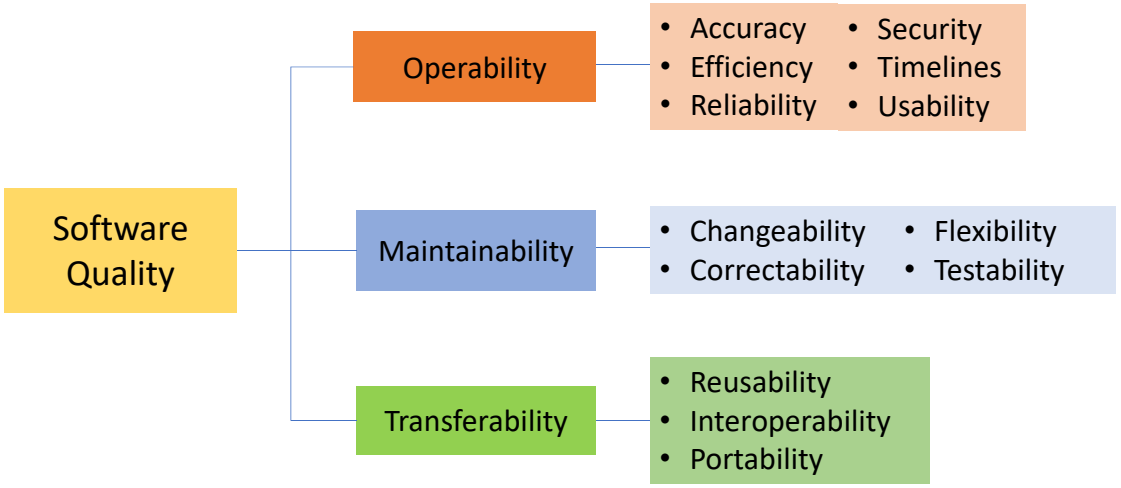
## Implementation Phase

Develop and test the product, and convert it to the new system

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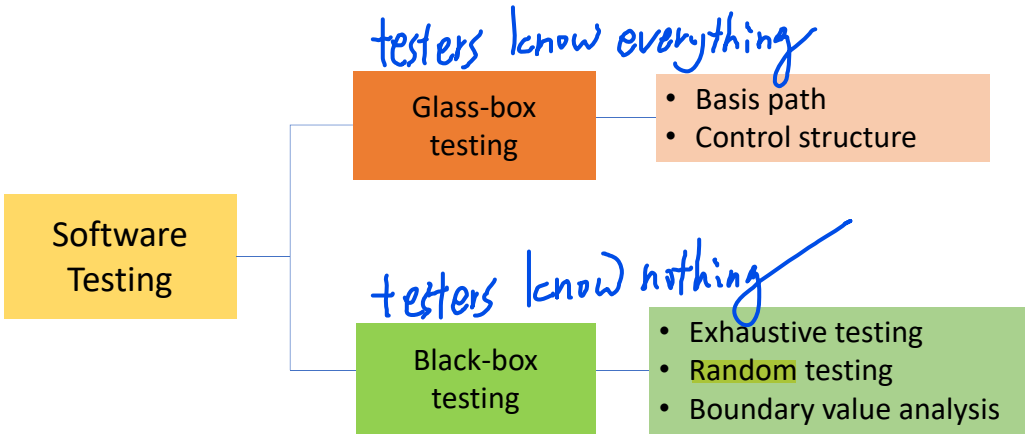
Implementation Phase

## Testing Phase

Develop and test the product, and convert it to the new system

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## Glass-box testing (white-box testing)

- Goal: determine whether all components of the software work according to their design purpose
- Assumes that the tester knows everything about the software
  - Software is like a glass box in which everything inside the box is visible
  - Testing is done by the software engineer
- All independent paths in each module are tested at least once
- All the decision constructs (two-way and multiway) are tested on each branch
- Every loop construct is tested
- All data structures are tested

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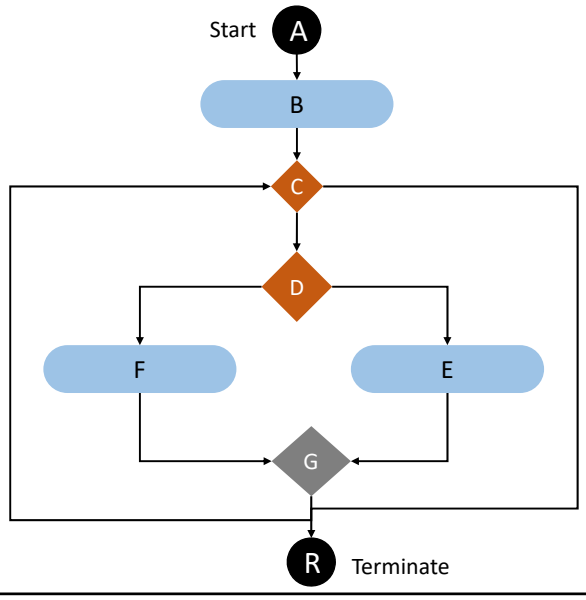
## Basis Path Testing

- Create a set of test cases that each statement in the software is executed at least once




Independent paths:
Path-1: (A, B, C, R)
Path-2: (A, B, C, D, E, G, R)
Path1: (A, B, C, D, F, G, R)

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## Control Structure Testing

- More comprehensive than basis path testing
- Use different types of tests
- Condition testing
  - Apply any condition expression in the module
  - Simple condition vs. Compound condition
- Loop testing
  - All types of loops (while, do, for)

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## Black Box Testing

- Test without knowing the internal functions of the software and how the software works
- Test the functionality of the software
  - Functions that the software should complete (e.g., input and output)

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## Exhaustive Testing

- Best black-box test method
- Test all possible input values of the software
- Difficult to apply in complex software (input domain is too huge)

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## Random Testing

- Test a selected subset of values in the input domain
- A subset of the selected values are evenly distributed in the input domain
- In this case, using a random number generator can be helpful

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## Boundary Value Testing

- Inputs must be greater than or equal to the boundary value
  - Greater than, equal, lower than
  - $x \geq 100000$, $x > 100000$, etc.

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## Predictive Development

Waterfall model takes each step separately and completes it before continuing to the next stage

- Pro: each stage knows exactly what to do because they have the complete results of the previous phases
- Con: difficult to locate a problem, the entire process must be checked

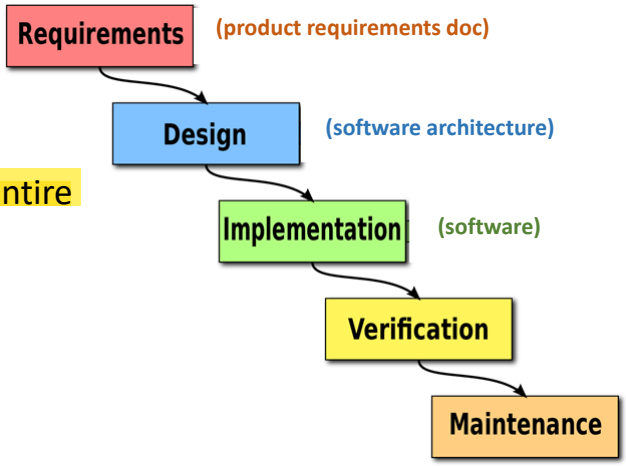


image credit: https://en.wikipedia.org/wiki/Waterfall_model#/media/File:Waterfall_model.svg

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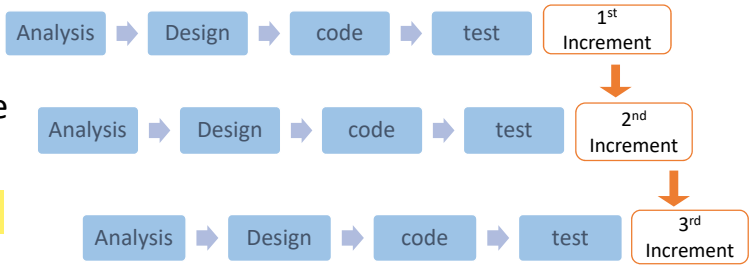
## Incremental model

Software is developed in a series of steps

- First: a simplified version of the system
  - Represent the entire system by little details
- Second: Include more details
- Pro: easy to find problems
- Con: problems might cause due to system architecture fails to accommodate all requirements for the entire software lifecycle

(need good planning and designing)

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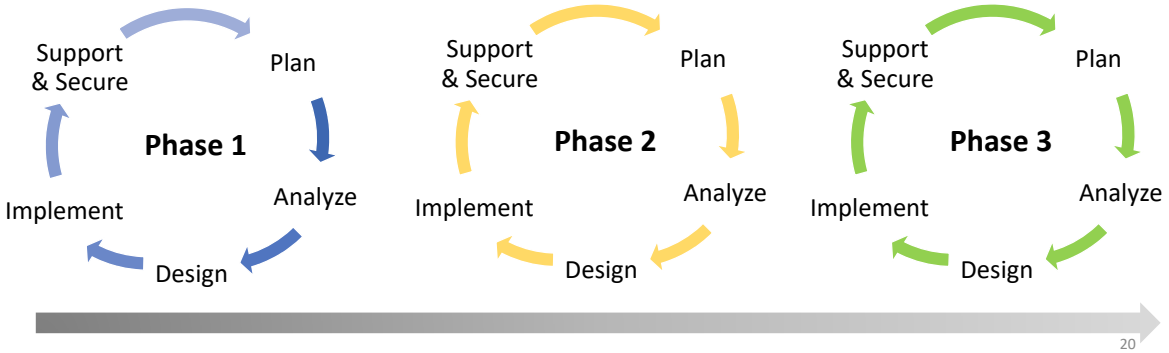
## Agile Development (Adaptive Development)

Incorporate the iterative and incremental software development

Increase flexibility to the project goals and scope

- Evolving in phases
- Adding components according to user needs or requirements
- Incorporate testing and feedback from users at all processes and phases
  - Change rapidly to adapt to the market

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Instructor：CHIEN SHIH-YI
系所：資管一甲、資管一乙
上課時間 (Session)：五23 (fri09-11)

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