

Exercise walk-through

Program Development Life cycle ■ 12.1

eXercise

You must be able to

- explain the **purpose** of a development life cycle
- describe the **analysis, design, coding, testing, maintenance** stages
- compare models (**waterfall, iterative, RAD, agile**) and choose one

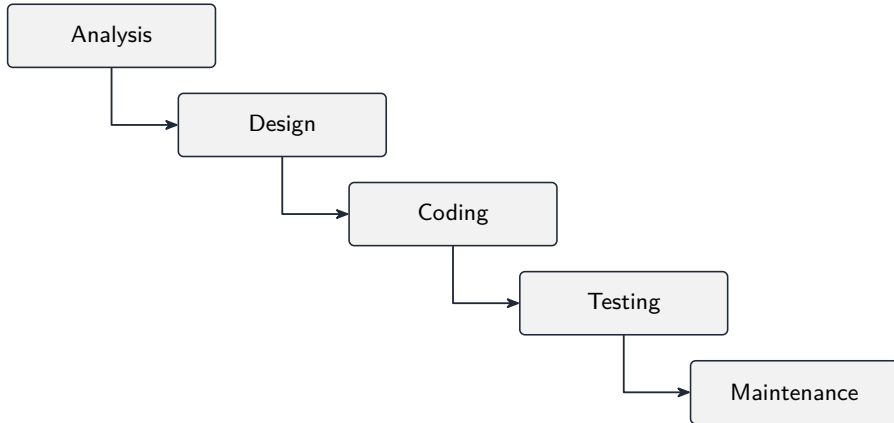
Method — Purpose and the five stages

A development life cycle is the set of stages from idea to maintained software. It exists to **plan, manage and control** a project — to build the right product, on time, with good quality.

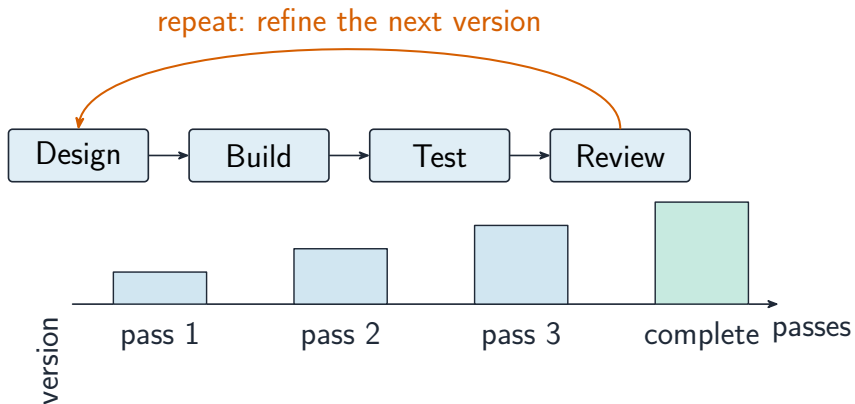
- **analysis** — find **what** the program must do (gather requirements).
- **design** — decide **how**: data structures, algorithms, modules, interface.
- **coding** — write the source code from the design.
- **testing** — run against test data and fix bugs.
- **maintenance** — after release, keep it working and useful.

Three kinds of **maintenance**: **corrective** 纠正性 (fix bugs found in use), **adaptive** 适应性 (change it for a new operating system, new law or new hardware), and **perfective** 完善性 (improve performance or add features users ask for).

Method — Purpose and the five stages



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The iterative model contrasts with the waterfall

Method — The models

Model	Principle	Best when	Drawback
Waterfall	linear; finish each stage first	requirements are stable	poor at mid-project change
Iterative	repeated passes refine it	requirements emerge over time	harder to estimate
RAD	fast prototypes + user feedback	requirements change	needs user availability
Agile	short sprints, constant testing	change is constant	needs a committed customer

Choose by how **clear** and **stable** the requirements are at the start.

Practice 2.1 ■ 1 mark

State the **purpose** of a development life cycle.

Solution 2.1

Method: Purpose and the five stages

Worked steps

To **plan, manage and control** the project — to build the right product, on time, to good quality **B1**.

Practice 2.2 ■ 2 marks

Name the **five** stages of the life cycle, **in order**.

Solution 2.2

Method: Purpose and the five stages

Worked steps

Analysis → Design → Coding → Testing → Maintenance **B1** **B1** *all five present, correct order.*

Practice 2.3 ■ 1 mark

At which stage are the **data structures and algorithms** decided?

Solution 2.3

Method: Purpose and the five stages

Worked steps

The **design** stage [B1](#).

Practice 2.4 ■ 1 mark

State what happens during the **maintenance** stage.

Solution 2.4

Worked steps

Keeping the released program **working and useful** — fixing faults found in use, and adapting it to new needs **B1**.

Exam-style 3.1 ■ 4 marks

Describe what happens in the **analysis** stage and in the **testing** stage.

Solution 3.1

Worked steps

Analysis — find and document **what** the program must do (the requirements) **B1 B1**. **Testing** — run the program against **test data**, compare with expected results, and fix the bugs found **B1 B1**.

Exam-style 3.2 ■ 2 marks

State **one** benefit of the **waterfall** model and **one** benefit of the **iterative** model.

Solution 3.2

Worked steps

Waterfall — any one: clear/simple, well documented, easy to manage with stable requirements **B1**. Iterative — any one: problems caught earlier, copes with changing requirements, a working partial version appears sooner **B1**.

Exam-style 3.3 ■ 3 marks

A company's project has requirements that are likely to **change a lot** during development. State a suitable life-cycle model and **justify** your choice.

3.4 (a) State what **adaptive** maintenance is.

(b) Give **one** example of a change that would need adaptive maintenance.

Solution 3.3

Method: Purpose and the five stages

Worked steps

A suitable model: **agile** (or iterative / RAD) **B1**, because it works in **short repeated cycles with user feedback** **B1**, so changing requirements can be handled without restarting the whole project **B1**.