

Exercise walk-through

Fault Tolerance ■ 4.2

eXercise

You must be able to

- explain how **fault tolerance** 容错 lets a system keep working when part fails
- describe how **redundancy** 冗余 supports fault tolerance
- explain why the Internet is fault tolerant
- identify a **single point of failure** 单点故障

Method — Fault tolerance

A **fault-tolerant** system keeps working even when **part of it fails**.

Method — Redundancy

Redundancy — having more than one path or copy — supports fault tolerance. The Internet is fault tolerant because packets can take **alternate routes** when a path goes down.

Method — Single point of failure

A **single point of failure** is one component whose failure brings down the whole system. Redundancy removes it, but at extra **cost**.

Practice 2.1 ■ 1 mark

Define fault tolerance.

Solution 2.1

Worked steps

the ability of a system to keep working when part of it fails **B1**.

Practice 2.2 ■ 1 mark

State how redundancy supports fault tolerance.

Solution 2.2

Method: Redundancy

Worked steps

it provides more than one path or copy, so a backup takes over when one fails **B1**.

Practice 2.3 ■ 1 mark

Define a single point of failure.

Solution 2.3

Method: Single point of failure

Worked steps

a single component whose failure brings down the whole system **B1**.

Exam-style 3.1 ■ 1 mark

Fault tolerance lets a system

- A** fail completely
- B** keep working when part of it fails
- C** run faster
- D** compress data

Solution 3.1

Method: Fault tolerance

- A fail completely
- B keep working when part of it fails
- C run faster
- D compress data



Worked steps

B.

Exam-style 3.2 ■ 1 mark

The Internet is fault tolerant because packets can

A take alternate routes

B be deleted

C be encrypted

D be sorted

Solution 3.2

Method: Redundancy

A take alternate routes



B be deleted

C be encrypted

D be sorted

Worked steps

A.

Exam-style 3.3 ■ 1 mark

A network has only one cable connecting two cities.

- (a) Name this weakness.
- (b) State how to make the connection fault tolerant.
- (c) State the trade-off of adding redundancy.

Solution 3.3

Method: Redundancy

Worked steps

- (a) a single point of failure **B1**.
- (b) add a second (redundant) path or cable **B1**.
- (c) the extra cost of the redundancy **B1**.