



## STUDY GUIDE

# Run the businesses of Harbour Island and learn IT by doing it

For students. One section for each business and level, with the situation, what you will do, key terms, questions before and after you play, and room for notes. No answers inside: the game shows you when it works.



**Corner Market**  
Lessons 1, 4, 9, 14

**Byte Repair**  
Lessons 2, 3

**Head Office**  
Lessons 5, 6, 12

**Stockroom**  
Lessons 7, 8, 13

**Harbour Branch**  
Lessons 9, 10

**Cloud Hub**  
Lessons 11, 15

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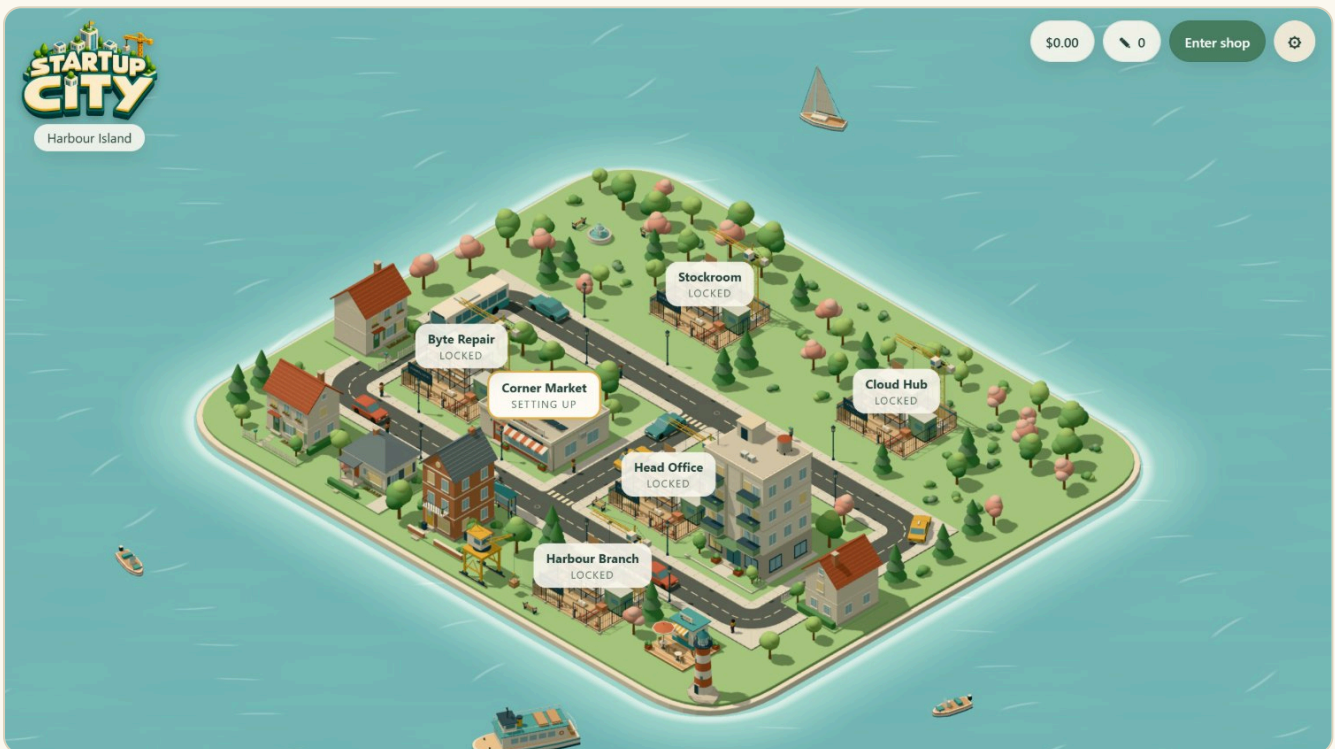
# Welcome to Harbour Island

Startup City is a game about running businesses on an island, and about the information technology that keeps them working. You learn IT by doing it: unpacking equipment, plugging cables into the right ports, setting up accounts and networks, and finding out why something has stopped.

## What the game is

Harbour Island is a small city seen from above, with roads, houses, boats, buses and people going about their day. Six of its buildings are businesses that you will open, one after another. Each business has real IT jobs waiting: a checkout to wire up, computers to upgrade, a database to design, a network to build, data to protect. Everything in the world is driven by what you actually do. If a cable is in the wrong port, the device really does not work; when you fix it, the shop comes alive.

The game follows the fifteen lessons of the IT Fundamentals course on Wikiversity, a free online learning site. Each lesson is played in one of the businesses, and fourteen campaign levels take you around the city, visiting some businesses more than once. There are no quiz questions to answer: you show what you know by making things work.



Harbour Island at the start. Only the Corner Market is open; the other lots show "Locked" until the game reaches them.

## Your role

You are the person who makes the technology work for a growing group of local businesses. Staff ask you for help, customers wait at the counter, and deliveries depend on the systems you set up. You will be a shop fitter, a repair technician, an IT administrator, a database designer, a network engineer, a security adviser, a programmer and, by the end, the person who keeps the whole city trading when disaster strikes.

## The six businesses

| Business              | Lessons played there                                            | Campaign levels                |
|-----------------------|-----------------------------------------------------------------|--------------------------------|
| <b>Corner Market</b>  | 1 Introduction, 4 Peripherals, 9 Networking, 14 Troubleshooting | Opening day, Level 4, Level 14 |
| <b>Byte Repair</b>    | 2 Devices, 3 Components                                         | Level 2, Level 3               |
| <b>Head Office</b>    | 5 Operating Systems, 6 Applications, 12 Security Practices      | Level 5, Level 6, Level 12     |
| <b>Stockroom</b>      | 7 Database Concepts, 8 Database Use, 13 Software Development    | Level 7, Level 8, Level 13     |
| <b>Harbour Branch</b> | 9 Networking, 10 Internet                                       | Level 9, Level 10              |
| <b>Cloud Hub</b>      | 11 Security Concepts, 15 Business Continuity                    | Level 11, Level 15             |

## The route through the city

Levels open in this order. Each one needs the one before it, so you will cross the city several times.

| Level | Title                        | Business       | Lesson                            |
|-------|------------------------------|----------------|-----------------------------------|
| 1     | <b>Opening day</b>           | Corner Market  | Lessons 1, 4, 9, 14 (first slice) |
| 2     | <b>The delivery team</b>     | Byte Repair    | Lesson 2: Devices                 |
| 3     | <b>The slow studio</b>       | Byte Repair    | Lesson 3: Components              |
| 4     | <b>The busy counter</b>      | Corner Market  | Lesson 4: Peripherals             |
| 5     | <b>A place for everyone</b>  | Head Office    | Lesson 5: Operating Systems       |
| 6     | <b>Tools of the trade</b>    | Head Office    | Lesson 6: Applications            |
| 7     | <b>Orders in order</b>       | Stockroom      | Lesson 7: Database Concepts       |
| 8     | <b>The stockroom rush</b>    | Stockroom      | Lesson 8: Database Use            |
| 9     | <b>Across the street</b>     | Harbour Branch | Lesson 9: Networking              |
| 10    | <b>Open to the world</b>     | Harbour Branch | Lesson 10: Internet               |
| 11    | <b>Who gets the keys?</b>    | Cloud Hub      | Lesson 11: Security Concepts      |
| 12    | <b>A safer working day</b>   | Head Office    | Lesson 12: Security Practices     |
| 13    | <b>Make it automatic</b>     | Stockroom      | Lesson 13: Software Development   |
| 14    | <b>The morning breakdown</b> | Corner Market  | Lesson 14: Troubleshooting        |
| 15    | <b>Keep the city trading</b> | Cloud Hub      | Lesson 15: Business Continuity    |

## How to use this guide

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- Before you play a level, read its page: the situation, what you will do and the key terms. Try the “Before you play” questions; there are no wrong guesses.
- After you play, answer the “After you play” questions in the space provided. Use your own words and what you saw in the game.
- The glossary at the back explains the IT words used in the game. The tracker on the last page lets you tick off each level.
- This guide never gives you the answers. The game shows you when something works, and that is the best proof you understood it.

# How to play

Everything in Startup City is done with your hands: drag things into the world, click things to look at them, and watch what happens.



Inside the Corner Market: the goal card at the top left, view buttons at the top right and the tray of boxed equipment along the bottom.

## The tray: real items, dragged into the world

Along the bottom of the screen is the tray. It holds real 3D models: devices, cables, parts, software boxes, data parcels and tools. Drag an item up out of the tray and drop it where it belongs: a device on the counter, a plug in a port, a part in a slot, a box on a laptop. Things only go where they physically fit. A plug of the wrong shape will not go into a port, and a part will not seat in the wrong slot.

- If you change your mind, press Escape, drop the item on empty floor, or let go outside the window: it goes back where it came from.
- Items already in the world can usually be dragged again, for example to unplug a cable or move a device.
- Some items can be dragged back into the tray to put them away.

## Click to inspect and use

Click or tap devices to open their screens and see their status: a terminal's settings, a printer's lights, a PC's files. Click people to talk to them or to let them try their job. Staff tell you when something is missing or wrong, and what they tell you is a clue.

## Moving around

- Drag empty space to move the view. Use the mouse wheel, or pinch on a touch screen, to zoom.
- The buttons at the top right switch between the whole room and close-ups, and name the places where a level's work happens (for example "Checkout 2", "Test bench" or "IT bench").
- The City button takes you back to the map of the island.

## The goal card and hints

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The goal card at the top left always tells you the next thing to do, in a few words. Dots show how far through a job you are. If you are stuck, press Hint. Each further press of More help gives a more specific clue. Hints may also appear by themselves if you have not done anything for a while.

### Using hints is fine

Hints never take away progress. If you use one during a level, the level card shows "Hints used", which simply records that you had help this time. You can always play a level again later without them.

## The level card: stations, practice and the final check

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When a level is in play, a second card shows its number, a link to its Wikiversity lesson page and its parts:

- **Three stations** (A, B and C). Each is a group of jobs. A station is ticked only when the world really works, not when you click something.
- **Practice with a new setup.** Press Practice to try the level again with things changed. It runs on a copy: your real setup comes back afterwards. You need to complete a practice run before the final check.
- **Final check.** When all three stations and the practice run are done, press Final check. The game re-tests your work. If something has come unplugged or changed, it tells you what, and you can fix it and check again.

## The city and unlocking businesses

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On the island map each business has a floating name tag. Click the tag to go inside: the roof lifts and the front walls fold down so you can see in. A business that is not open yet is a construction site whose tag says "Locked". Businesses open one after another as you progress: the Corner Market first, then Byte Repair, Head Office, the Stockroom, Harbour Branch and Cloud Hub. Your teacher may open every business at once in Settings (teacher mode), for example to start a class on a later lesson.

## Your journal

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Press J, or the pencil button at the top, to open your journal. It lists what you have shown you can do, lesson by lesson, and lights up the six areas of IT as you work in them. Each entry has a short explanation. It is a record to read, not a list of tasks.

## Settings, keyboard and saving

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- The gear button opens Settings: reduce motion, mute sound, pause the city (people and traffic), and keyboard and screen-reader controls.
- Press K for keyboard controls: every drag and click has a keyboard equivalent, and it works with a screen reader.
- On a normal web page your progress saves automatically on the device you play on. Inside the edu.games player it lasts until you close the page.
- "Start over" in Settings clears your saved progress, so only use it if you really mean to.

# Corner Market

The Corner Market is where everything starts. You unpack its equipment, wire it up, find out why the first receipt will not print and serve the first customer. You come back twice: to open a second checkout (Level 4) and to sort out a morning when everything seems to break at once (Level 14).

Lesson 1: Introduction

Lesson 4: Peripherals

Lesson 9: Networking

Lesson 14: Troubleshooting



The Corner Market open for business: a customer brings an item to the till.

## Levels here

| Level | Title                        | Goal card                                  |
|-------|------------------------------|--------------------------------------------|
| 1     | <b>Opening day</b>           | Get the shop open and make the first sale. |
| 4     | <b>The busy counter</b>      | "Open a second checkout."                  |
| 14    | <b>The morning breakdown</b> | "Get the morning moving."                  |

## More to explore

After the first sale, the Corner Market offers extra jobs: program the LED board, put up a promo screen, pair a cordless scanner, set up a security camera, restock using the sales report, and handle the Saturday rush.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.

# Opening day

Goal card: "Unpack the new equipment onto the counter."

## The situation

The Corner Market is empty apart from a counter, shelves and a closed sign on the door. New equipment has arrived in boxes: a checkout terminal, a barcode scanner, a receipt printer, a router and some cables. Nothing is plugged in. Your job is to get the shop open and make its first sale. One thing will not work first time, on purpose.



Every lead is plugged in by hand: power, USB and Ethernet.

## What you will do

1

### Unpack

Drag the checkout terminal, barcode scanner, receipt printer and router from the tray onto the counter.

2

### Power

Each device has a power plug lying beside it. Plug each one into the power strip on the counter.

3

### Connect the scanner

Connect the scanner to the terminal.

4

### Connect the printer

The printer has a square port and the terminal only has flat ones. Find the cable that joins them.

5

### Get online

Card payments need the internet, which arrives at the fibre modem on the pillar.

6

### Test print

Print a test receipt from the terminal. If it does not print, find out why.

7

**Open up**

Flip the sign on the door to OPEN.

8

**First sale**

Scan the item by dragging it across the scanner window. The customer pays by card. Hand them the receipt.

## More at the Corner Market

After the first sale, Byte Repair opens in the city, and the Corner Market has more to offer. None of these blocks your way forward, but each teaches something:

| Job                     | What you do                                                                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LED board</b>        | Make the board above the shelves say OPEN, one byte per letter, with eight bit switches or two hex digits. Then show a letter that is not in ASCII. |
| <b>Promo screen</b>     | Put the new promo screen on the counter and get a picture on it. Choose a picture the shop is allowed to use.                                       |
| <b>Cordless scanner</b> | A crate is too heavy for the counter scanner. Pair the cordless scanner and scan the crate.                                                         |
| <b>Security camera</b>  | Set up the IP camera, find it on the network and change its factory password.                                                                       |
| <b>Restocking</b>       | Customers are leaving without buying. Use the sales report to decide what to order in a van with limited space.                                     |
| <b>Saturday rush</b>    | After a few sales, the checkout stops. Ask, look, write a theory in the notebook, test it, fix one thing, check and sign off.                       |

## Key terms

**Terminal:** the checkout computer

**Router and modem:** the modem connects to the provider; the router connects your devices to it

**WAN and LAN ports:** the router port facing the internet; the ports for your own devices

**Driver:** software that lets the terminal use a device

**Self-test:** a check a device runs on itself

**Binary and hex:** numbers written with two digits, or with sixteen

**ASCII and UTF-8:** codes that turn letters into numbers

**Input, processing, storage, output:** the computing cycle behind every sale

### BEFORE YOU PLAY

1. What do you think a shop checkout needs to be plugged into to take a card payment?

2. If a printer does not print, list three different things that could be wrong.

3. Computers store letters as numbers. How many different letters could you store with eight switches that are either on or off?



### AFTER YOU PLAY

1. Why did the first test receipt not print? What told you the printer itself was fine?  
-----
2. Follow one sale from scan to receipt. Which step was input, processing, storage and output?  
-----
3. Which router port did the modem cable go into, and why does that matter?  
-----
4. If you programmed the LED board: what number is the letter O, and how did you make it with the switches?  
-----

### YOUR NOTES



# The busy counter

Goal card: "Open a second checkout."

Where: the Corner Market: a second checkout, a photo and repair bench and a connector cabinet.

## The situation

Saturdays are busy and the Corner Market needs a second checkout. Terminal 2, a customer display, a keyboard, a receipt printer, a cordless scanner, a mouse, an NFC pad and a shared network printer are all waiting in the tray. At the back, a photo and repair bench has old equipment to bring back to life. Look closely at the ports: some look the same and do different things.

## What you will do

- A Station A: Assemble the counter**  
Power up checkout 2 and set out its display, keyboard, printer and scanner. Get a picture on the display, the keyboard typing and receipts printing, then run the test cycle and serve two customers.
- B Station B: Wireless and shared devices**  
Pair the cordless scanner, get a wireless mouse moving, tap a test card on the NFC pad and share the network printer with checkout 2. At the photo bench, connect a webcam, speakers and an external drive, then record, play and save a clip.
- C Station C: Reuse the old equipment**  
Fulfil three repair jobs using the connector cabinet. Pick up connectors to read what each is for, plug in, then try the device.
- P Practice with a new setup**  
Checkout 2 broke overnight in two different ways. Find and fix each fault. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks that checkout 2 has served two customers. Everything from the stations must still work too.

## Key terms

**Peripheral:** a device added to a computer, such as a printer, scanner or display

**Driver:** software that lets the operating system use a particular device

**USB-A, USB-B, USB-C:** three USB plug shapes; USB-C sockets do not all carry video

**Bluetooth pairing:** linking two wireless devices after checking they match

**Port:** the socket a cable plugs into; its shape and what it carries both matter

**Plug and play:** a device that works as soon as it is connected

**HDMI:** a common digital video and audio connector

**RF receiver:** a small plug-in radio that talks to one wireless device

## BEFORE YOU PLAY

1. If a plug fits a socket, does that mean it will work? Think of an example.

2. Why might a printer be switched on and plugged in but still not print?

3. What is the difference between a device you pair (Bluetooth) and one you plug a receiver in for?

## AFTER YOU PLAY

1. Which connection surprised you most? What told you it was the right or wrong one?

2. The receipt printer needed something before it would work. What, and why did the keyboard not need it?

3. How did you find the shared network printer? What would go wrong if two devices used the same address?

4. Describe one repair job: which connector did you choose, and how did you know it worked?

## YOUR NOTES

LEVEL  
**14**

CORNER MARKET · LESSON 14: TROUBLESHOOTING

# The morning breakdown

Goal card: "Get the morning moving."

Where: the Corner Market's support corner: a job board, a support tablet, a stock sync box and a pin board, with a magnifier, hypothesis tags, a known-good cable and a test dongle in the tray.

## The situation

It is morning and things have stopped. Mia's receipts are not printing, card payments are failing, or Sam's stock sync to the Stockroom has stalled. These are the real systems you have built across the city, not a pretend broken scene. The support tablet and the tools in the tray are there to help you work like a technician: look first, form an idea, test it, fix one thing, check, and write it up.

## What you will do

- A Station A: One fault, evidence first**  
One fault, evidence first: see the problem, ask what changed, tag a suspect and run a test that tells two suspects apart. Fix it and check the job works again.
- B Station B: Two problems that look related**  
Two problems that look related: some trouble is local and some reaches out across the network. Fix each cause on its own and check both jobs. Think before a restart: what else would it interrupt?
- C Station C: Know when to escalate**  
Know when to escalate: when everything local passes and only the provider fails, gather the evidence, send it to the (fictional) provider, keep trading with an approved fallback, and confirm the timeline.
- P Practice with a new setup**  
Start another morning: the same symptom, a different cause. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks the morning's problems are all resolved, no job has stalled again, the shared stock folder is not open to everyone and the timeline is confirmed. Everything from the stations must still work too.

## Key terms

**Symptom and cause:** what you notice; what is really wrong

**Reproduce:** make the problem happen again on purpose to see it clearly

**Known-good part:** a part you trust, used to rule something in or out

**Escalate:** hand a problem to someone who can fix it, with your evidence

**Hypothesis:** your best idea about the cause, which a test can support or rule out

**Divide and conquer:** testing halves of a system to narrow down where a fault is

**Rollback:** undoing a change that made things worse

**Timeline:** what happened, in order, linked to the evidence

## BEFORE YOU PLAY

1. When something stops working, what is the first thing you usually do? Is it always the best first step?

2. Why is "restart everything" sometimes a bad idea at work?

3. What would you want to know before you called a provider's support line?

## AFTER YOU PLAY

1. Which test told two suspects apart? What would a random swap have taught you?

2. Was your first idea right? If not, what made you change it?

- ### 3. How did you decide a problem was not yours to fix?

4. Read back your timeline. Could someone else follow what you did and why?

## YOUR NOTES

# Byte Repair

Byte Repair opens after your first sale. It fixes, upgrades and supplies computers and gadgets. Here you equip a delivery team with the right devices (Level 2) and rescue a slow design studio by working inside a real PC (Level 3).

Lesson 2: Devices

Lesson 3: Components



Byte Repair, which opens after the Corner Market's first sale.

## Levels here

| Level | Title                    | Goal card                |
|-------|--------------------------|--------------------------|
| 2     | <b>The delivery team</b> | "Equip the team."        |
| 3     | <b>The slow studio</b>   | "Get the studio moving." |

## More to explore

Byte Repair's older jobs include matching devices to staff, delivering a large project on the right drive or upload plan, and upgrading a PC so a render finishes on time.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.



# The delivery team

Goal card: "Equip the team."

Where: Byte Repair, with its courier bay, a device test bench and a wall of connected things.

## The situation

Byte Repair is kitting out a small delivery team. Priya the courier, Leo the designer and Sam the supervisor each have a real job to do, and so do three places: the shared files closet, the cold drinks fridge and the staff lounge TV. The tray is full of phones, tablets, a laptop, a workstation, a small server, a games console and connected gadgets. Some of them look alike but are different inside.

## What you will do

- A Station A: Right tool, real task**  
Hand a device from the tray to each person or place, then let them try their job. If it does not work, they tell you what was missing. Swap and try again: nothing is lost by a wrong guess.
- B Station B: Capacity is not speed**  
At the test bench, send the same 800 MB parcel down two network links of different speeds and watch the clock. Build one byte out of bit cells, flip a lever between two ways of counting storage, open nested storage boxes all the way up to a petabyte, and run one job on two processors with different-looking speed labels.
- C Station C: Connected things**  
On the connected-things wall, put each gadget in its place and link it to the screen or device that uses its data. Test what happens when a connection is lost, pair a handheld scanner, tap a test card and try the camera's privacy shutter.
- P Practice with a new setup**  
A new team phone has arrived and Priya's route still has no Wi-Fi. Get her delivering again. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks again that everyone holds a device their job has really run on. Everything from the stations must still work too.

## Key terms

**Capability:** something a device can actually do, such as GPS, a camera or mobile data

**IoT:** the Internet of Things: everyday objects with sensors that connect to a network

**Mbps:** megabits per second, a measure of how fast data moves

**Hertz (Hz):** cycles per second; 1 GHz is a thousand million cycles a second

**Server:** a computer built to serve many others and stay on day and night

**Bit and byte:** a bit is a single 0 or 1; a byte is eight bits

**kB and KiB:** a kilobyte is 1000 bytes; a kibibyte is 1024 bytes

**NFC:** near-field communication: a very short-range wireless link, used for tap-to-pay

## BEFORE YOU PLAY

1. What does a courier on a bike need a device to do? List at least three things.

2. A file is 800 megabytes. A network link is 80 megabits per second. Do you think it takes 10 seconds to send? Why might it not?

3. Name three objects in your home or school that might be “connected things”. What does each one send, and to what?

## AFTER YOU PLAY

1. Which person was hardest to equip, and what capability made the difference?

2. Why did the faster link take the time it did? Explain it using bits and bytes.

3. What did the 1000 MHz and 1 GHz runs show? Why can clock speed alone not tell you which of two different processors is faster?

4. Pick one connected thing. What was its input, where did its data go, and what happened when the connection was lost?

## YOUR NOTES



# The slow studio

Goal card: "Get the studio moving."

Where: the Byte Repair workbench, with a studio PC, an ARM kiosk, an optical drive and the shop network.

## The situation

A design studio's poster preview crawls. The studio PC sits open on the Byte Repair workbench beside a kiosk, a pile of parts and several places to keep files: the PC's own drive, a flash drive, a disc, network storage, a file server and the cloud. Your job is to find out why the work is slow, get the right system starting, and learn where saved work really lives.

## What you will do

- A Station A: Diagnose and upgrade**  
Run the poster job and watch what the PC tells you. Shut it down safely, open the case and add the part that helps. Then a second job shows up with parts missing: read why it stops and put things right.
- B Station B: Boot the right system**  
Look over the motherboard and its firmware. Fit a new drive and make the PC start from it. Get the same program running on two machines with different kinds of processor, and find out whether a graphics card helps every job.
- C Station C: Where did the work go?**  
Save one file, leave another unsaved, then pull the plug and see what survives. Save and reopen the poster in each storage place, then pull the internet line and the network cable to see what still opens.
- P Practice with a new setup**  
A different job stops partway. Find out why: the fix you used before may not be the one that helps now. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks that the studio PC starts from its new drive and the kiosk runs a build made for its processor. Everything from the stations must still work too.

## Key terms

**RAM:** the computer's working memory; fast, but emptied when the power goes

**Paging:** moving data between RAM and the disk when RAM is full; it makes work slow

**Boot order:** the list of drives the firmware tries to start from

**GPU:** the graphics processor; it speeds up some jobs, not all

**Storage:** where files are kept when the power is off: SSD, hard disk, flash, disc

**Firmware:** the small program on the motherboard that starts the computer

**x86 and ARM:** two families of processor; a program must be built for the right one

**NAS:** network-attached storage: a drive other computers reach over the network

## BEFORE YOU PLAY

1. When a computer is slow, what could be the cause? Guess at least two different parts.  
-----
2. What is the difference between "memory" and "storage"? Which one keeps your work when the power goes off?  
-----
3. If a file is saved "in the cloud", what has to be working for you to open it?

## AFTER YOU PLAY

1. What did the PC show you that told you which part to change? What would have happened if you had changed a different part?  
-----
2. Why did the new drive need a change in the firmware before the PC used it?  
-----
3. Which storage places still opened with the internet line pulled? With the network cable pulled? Why?  
-----
4. A synced copy is not the same as a backup. What did the game show that suggests why?

## YOUR NOTES

# Head Office

Head Office is where the business is run. Its computers use a pretend operating system called ShopOS. Here you give everyone a workspace (Level 5), launch a new branch with the right software (Level 6), and later make the working day safer (Level 12).

Lesson 5: Operating Systems

Lesson 6: Applications

Lesson 12: Security Practices



Head Office, where staff PCs run a simulated operating system called ShopOS.

## Levels here

| Level | Title                       | Goal card                    |
|-------|-----------------------------|------------------------------|
| 5     | <b>A place for everyone</b> | "Give everyone a workspace." |
| 6     | <b>Tools of the trade</b>   | "Launch the new branch."     |
| 12    | <b>A safer working day</b>  | "Secure the working day."    |

## More to explore

Head Office's older jobs run on the ShopOS desktops: accounts, a frozen browser, the print spooler, folders and permissions, the console, USB drives, licences, cloud email, a three-tier web shop, a malware outbreak, passwords, encryption, phishing and a signed IT policy.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.



# A place for everyone

Goal card: "Give everyone a workspace."

Where: Head Office: a shared workstation with a badge reader, an OS cutaway and a shared-drive shelf, and an IT bench.

## The situation

Head Office has one shared workstation and three people who use it: OWNER, CASHIER and DESIGNER. Some files are for everyone, some for one person, and one is private. On the IT bench, four devices wait for operating systems and a demo host waits for a hypervisor. Something on the workstation keeps freezing, and the printer will not print.

## What you will do

- A Station A: Accounts and files**  
Create accounts for everyone, sort the new files into folders, and set who may use each folder. Then sign in with each person's badge and try opening and editing files. Rename a file and make a folder with the console.
- B Station B: Free the frozen screen**  
One app has frozen: unfreeze it without upsetting the rest. Get a test page out of the printer, and schedule a nightly sales export that really runs.
- C Station C: Put systems in the right places**  
Install the right operating system on each device on the IT bench and run two guest systems on the demo host. Copy a big video to a USB drive and compare three differently formatted drives.
- P Practice with a new setup**  
New files, new people and new rules: fix the permissions, free a different frozen app and copy a different big file. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks that OWNER, CASHIER and DESIGNER still have their accounts (OWNER an administrator) and the nightly export is still scheduled. Everything from the stations must still work too.

## Key terms

**Operating system (OS):** the software that runs a device and shares it between programs and people

**Permission:** a rule saying who may read or change a file or folder

**Service:** a program that runs in the background, such as the print spooler

**Hypervisor:** software that runs several operating systems as guests on one machine

**Account:** a sign-in identity; an administrator account can change the system

**Process:** a running program; Task Manager can end one that has hung

**File system:** how a drive organises files: FAT32, exFAT, NTFS, Ext4, HFS

**Console:** a text window where you type commands instead of clicking

## BEFORE YOU PLAY

1. Why might a shop want different people to have different accounts on the same computer?  
-----
2. When one program freezes, what could you do that does not lose everyone else's work?  
-----
3. A phone, a laptop and a server all need an operating system. Why might they need different ones?

## AFTER YOU PLAY

1. Which person could open which folders? How did you prove it, rather than just setting it?  
-----
2. What was wrong with the printer, and which part of the operating system fixed it?  
-----
3. The USB drive had plenty of free space but still refused the video. Why?  
-----
4. What does a hypervisor let one physical machine do?

## YOUR NOTES



# Tools of the trade

Goal card: "Launch the new branch."

Where: the Head Office meeting room, set up as a launch room with two laptops, a launch board and a demo service rack.

## The situation

A new branch opens soon and the launch board is empty. Two laptops run different operating systems, and the tray holds eight boxes of (fictional) software, each with its own builds, read-me notes, bundled extras and licence options. Staff need a flyer, a budget, slides, messages and more. Not every app works everywhere, and not every licence covers everyone.

## What you will do

- A Station A: Produce the launch kit**  
Produce the launch kit: install a suitable app on a laptop, choose the build for that laptop's operating system, and make each item for the launch board.
- B Station B: Install and license correctly**  
Install and license correctly: compare what each licence allows with what the staff need, install an app without the extra nobody asked for, and test shared seats with all three staff.
- C Station C: Keep the right work available**  
Keep the right work available: pull the internet line, then the office network, and see which apps still work. Send a request through each architecture on the demo rack, then stop one service and send again.
- P Practice with a new setup**  
The laptop, its operating system or the network changes. Something that worked before may not work now. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks the launch board is complete and the network is plugged back in before the branch opens. Everything from the stations must still work too.

## Key terms

**Application:** a program for a task: word processor, spreadsheet, presentation, email

**Licence:** the permission to use software: per device, per person, per site, by subscription, open source

**Bundled software:** extra programs an installer adds unless you untick them

**Tier:** a layer of a system, such as the screen, the logic and the database

**Platform:** the operating system and processor an app is built for

**Concurrent licence:** a set number of people may use the software at the same time

**Local, LAN and cloud apps:** apps that run on the device, on the office network, or over the internet

### BEFORE YOU PLAY

1. Which kind of app would you use for a budget, and why not a word processor?  
.....
2. What is the difference between buying software once and paying a subscription?  
.....
3. If the internet goes down in a shop, which of the apps you use every day would stop?  
.....

### AFTER YOU PLAY

1. Which licence fitted the staff best, and why did a cheaper one not?  
.....
2. What did the installer try to add? How did you avoid it?  
.....
3. Which apps kept working without the internet? Without the office network? Why?  
.....
4. What happened when you stopped one tier of a three-tier system?  
.....

### YOUR NOTES



# A safer working day

Goal card: "Secure the working day."

Where: the security bench in Head Office: the working-day laptop and its maintenance bay, the courier's phone, a password vault, an evidence envelope and an "unknown reader" kiosk.

## The situation

A working day at Head Office is full of small risks: a laptop with a default login and pending updates, a download from somewhere unknown, reused passwords, a lost drive and a message that seems to be from the boss. Your job is to make the day safer without stopping the business app everyone needs. Every password and secret in the game is fictional.

## What you will do

- A Station A: Fix the devices**  
Harden the working-day laptop: default login, updates, firewall, apps and malware. Check who published each package before it goes in the maintenance bay, and keep the StockPro sync working.
- B Station B: Protect account access**  
Fix Mia's passwords: see what reusing one costs, use the vault, add a second factor, reset one safely, and set a password policy and read what it does.
- C Station C: Protect data while working**  
Protect the data at rest, on the way and when sharing: encrypt a file and a drive and hand the drive to an unknown reader, compare three ways of sending, share with one named person, and deal with a suspicious message.
- P Practice with a new setup**  
A look-alike download, an old session still signed in after a reset, or a file whose key is missing. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks the laptop still does its job, its firewall is on, the password policy is the recommended default and the drive is encrypted. Everything from the stations must still work too.

## Key terms

**Patch:** an update that fixes a security weakness

**Malware:** software designed to harm or spy

**Encryption:** scrambling data so only someone with the key can read it

**VPN:** an encrypted tunnel for network traffic

**Firewall:** a filter that allows only the network traffic you choose

**Password manager (vault):** an app that makes and keeps long, unique passwords

**At rest and in transit:** data stored on a device; data moving over a network

**Phishing:** a message that tricks you into giving away access or money

## BEFORE YOU PLAY

1. Why is it risky to use the same password on two websites?

2. If someone finds a lost laptop, what could they read? What might stop them?

- ### 3. How can you tell a genuine message from your boss from a fake one?

## AFTER YOU PLAY

1. Which step on the laptop nearly broke the business app, and how did you keep it working?

- ## 2. What did the leak drill show about reused passwords?

- ### 3. What could the unknown reader see before and after encryption?

4. What did you do with the "CEO" message, and why?

## YOUR NOTES

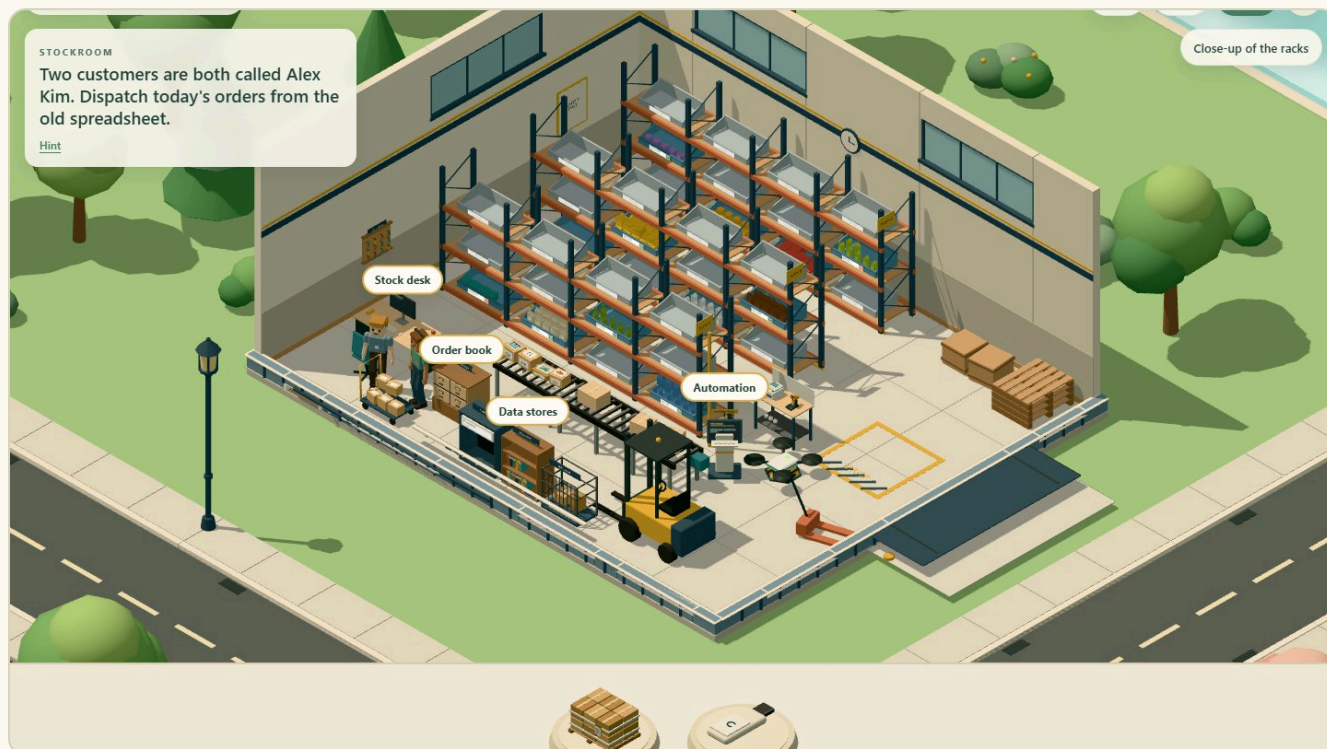
# Stockroom

The Stockroom runs on a real database: every bin on the racks shows the quantity stored in the Products table. Here you put orders in order (Level 7), handle a restocking rush with queries (Level 8), and later automate the stock alerts with a program you build from blocks (Level 13).

Lesson 7: Database Concepts

Lesson 8: Database Use

Lesson 13: Software Development



The Stockroom. Every bin follows the database: the stock you see is the stock in the table.

## Levels here

| Level | Title                     | Goal card                      |
|-------|---------------------------|--------------------------------|
| 7     | <b>Orders in order</b>    | "Send every parcel correctly." |
| 8     | <b>The stockroom rush</b> | "Restock the right shelves."   |
| 13    | <b>Make it automatic</b>  | "Automate the stock alerts."   |

## More to explore

The Stockroom's older jobs include the old order book spreadsheet, designing tables, sorting data parcels into stores, a stock database with SQL, and an automation console with an alert script, scanner firmware, a label printer and shelf labels.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.



# Orders in order

Goal card: "Send every parcel correctly."

Where: the Stockroom: a records desk with table trays, relationship cords, a terminal, three parcel lanes and a stores shelf.

## The situation

Parcels are going to the wrong houses. Two different customers are both called Alex Kim, and the old way of keeping orders cannot tell them apart. At the records desk, tables are trays, records are rows and fields are compartments. Two members of staff, Sam and Priya, both need to work on the orders at once.

## What you will do

- A Station A: Repair the model**  
Fix the order model: decide what identifies each record, choose the type of each field and connect the tables. Build it, import the sample data and try three bad writes: each one must be refused.
- B Station B: Two people, one stockroom**  
Let Sam and Priya change orders at the same time, first in the database, then in the old spreadsheet file. Restart the terminal and read an order back. Dispatch a parcel, change a customer's address, run the delivery report and count the work for a much bigger order book.
- C Station C: Different information, different containers**  
Put each kind of data in a container that fits it, then get something back from each store.
- P Practice with a new setup**  
Names change and rows are shuffled. Route every parcel again. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks the two Alex Kim customers are still distinct and every order line points at a real order and product. Everything from the stations must still work too.

## Key terms

**Database:** an organised, lasting store of records that many people can use at once

**Primary key:** a field whose value is unique to each record

**Constraint:** a rule the database enforces, such as "quantity must be positive"

**Key/value store:** a store that finds a value directly from its key

**Table, record, field:** a table holds records (rows); each record has fields (columns)

**Foreign key:** a field that points at a primary key in another table

**Flat file:** one file of data, like a spreadsheet, with no rules or links

**Document store:** a store for records whose shape varies, such as nested lists

## BEFORE YOU PLAY

1. Two people in your class have the same name. How does the school tell them apart on paper?  
-----
2. What could go wrong if two people edit the same spreadsheet file and save one after the other?  
-----
3. Is a photo “data”? Could you store it in a table of rows and columns?

## AFTER YOU PLAY

1. What finally told the two Alex Kims apart? Why is a name not enough?  
-----
2. What did the database do when both staff changed the same order? What did the spreadsheet do?  
-----
3. When a customer moved house, what happened to a parcel already dispatched, and why is that right?  
-----
4. Which container suited each kind of data, and why?

## YOUR NOTES



# The stockroom rush

Goal card: "Restock the right shelves."

Where: the Stockroom: a query workbench with a badge reader and drive slot, a Products shelf, a reorder truck and a spare terminal.

## The situation

It is a rush in the Stockroom. The shelves mirror the Products table, and the bins light up when a query picks them. Some products are running low, a new product arrives, a price changes, and the database itself needs a new table and field. The same questions can be asked in several ways.

## What you will do

- A Station A: Find and change records**  
Connect the workbench to the order database. Find every product with stock below 5 and send the reorder truck. Add a product and change a price, previewing each change before you commit it. Add a test product and delete it, then try Undo.
- B Station B: Evolve the database safely**  
Add a temporary table and a new field, let CASHIER read the products, and test what happens when CASHIER tries to write. Try to drop a table that others depend on, then drop only the temporary one.
- C Station C: Use it through different doors**  
Ask the same question through four different doors. Export a snapshot, carry it to the spare terminal, import it and check it.
- P Practice with a new setup**  
The stock levels change. Restock the right shelves again. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks that the stock database is still connected and the Products table still exists. Everything from the stations must still work too.

## Key terms

**Query:** a question put to a database, such as "which products have stock below 5?"

**SELECT, INSERT, UPDATE, DELETE:** read rows, add rows, change rows, remove rows

**WHERE:** the condition that picks which rows a command affects

**Commit and undo:** make a change permanent; take back the last committed change

**SQL:** Structured Query Language, used to ask and change a database

**CREATE, ALTER, DROP:** make a table, change its structure, remove the whole table

**GRANT and REVOKE:** give or take away a person's permission

**Export and import:** copy data out of a database and into another

## BEFORE YOU PLAY

1. "Below 5" and "5 or fewer": do they pick the same shelves? Why could that matter?

2. Why might it be dangerous to change the price of "every row" by accident?

- ### 3. Why should a cashier be able to look up stock but not change it?

## AFTER YOU PLAY

1. Which shelves lit up for "below 5"? Was there one you expected that did not light?

- ## 2. What is the difference between deleting rows and dropping a table?

3. What happened when CASHIER tried to write? Why is that a good thing?

- #### 4. How did you prove the imported copy on the spare terminal matched the original?

## YOUR NOTES

LEVEL  
**13**

# Make it automatic

Goal card: "Automate the stock alerts."

Where: the automation workshop beside the Stockroom: a programming bench, a conveyor, alert drones, a types bench and five code machines.

## The situation

Staff are tired of checking the shelves by hand. The automation workshop has a programming bench where physical blocks, dropped into rail sockets, make a real program. Crates ride a conveyor past a decision gate, and drones fly to the bins your program alerts. The first program is not quite right.

## What you will do

- A Station A: Build and run the logic**  
Make the program alert only the right products, through a reusable function. Make all four tests pass, step through the trace and install the automation in the Stockroom.
- B Station B: Types and objects matter**  
On the types bench, inspect a product object and a list, try to change a constant, build a record where each field has its own type, and run the awkward cases: an empty list, a value exactly on the limit and a number typed as text.
- C Station C: Different code, different jobs**  
Run each of five code machines with a changed input and see what each kind of code does.
- P Practice with a new setup**  
New stock levels, a switched-off product, an empty inventory or a count typed as text. Does your automation cope? Your real setup comes back afterwards.
- ✓ Final check**  
The game checks an automation is installed, alerts exactly what the rule says through `notify()`, and has a trace on file. Everything from the stations must still work too.

## Key terms

**Algorithm:** a set of steps that solves a problem

**Loop:** repeating steps, for example once for each product

**Function:** a named, reusable piece of a program

**Compiled and interpreted:** translated before running; run step by step

**Variable and constant:** a named value that can change; one that cannot

**Condition (branch):** a test that decides which steps run

**Data type:** the kind of value: integer, float, string, character, Boolean

**Pseudocode and flowchart:** ways of writing or drawing a program's logic

## BEFORE YOU PLAY

1. Write, in plain words, a rule for when a shop should reorder a product.

2. What should a program do if the list of products is empty?

- ### 3. Why might it matter whether a stock count is stored as a number or as text?

## AFTER YOU PLAY

1. What was wrong with the starting program? How did the trace help you see it?

2. What changed when you used the product's own reorder point instead of a fixed number?

- ### 3. Which edge case was the most surprising, and what did the program do?

4. Pick two code machines. How was the code in each one different?

## YOUR NOTES

# Harbour Branch

Harbour Branch is the waterfront business. Here you network a new shop across the street (Level 9) and bring online orders back by working through the internet stage by stage (Level 10).

Lesson 9: Networking

Lesson 10: Internet



Harbour Branch on the waterfront.

## Levels here

| Level | Title                    | Goal card                   |
|-------|--------------------------|-----------------------------|
| 9     | <b>Across the street</b> | "Connect both branches."    |
| 10    | <b>Open to the world</b> | "Bring online orders back." |

## More to explore

Harbour Branch's older jobs include fitting out a network cabinet, sorting out Wi-Fi for tablets, comparing internet services in a lunch rush, email for a shared mailbox, and browser jobs for suppliers.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.



# Across the street

Goal card: "Connect both branches."

Where: the Harbour Street shop on a pier beside the café, with its comms shelf, stockroom Wi-Fi and a provider street cabinet.

## The situation

The business is opening a shop across the street and it needs a network: tills, a printer, a stock box and a payroll PC must talk to each other and to the internet. The stockroom needs Wi-Fi at three work spots, and customers want guest Wi-Fi that must never reach payroll. Everything you need is in the tray.

## What you will do

- A Station A: Build a local network**  
Fit out the comms shelf, connect the shop to the provider, and give every device a working address. Close the firewall to anything undeclared, then test local printing, the web and the link to the café separately.
- B Station B: Cover the stockroom**  
Hang access points and walk a test tablet to each stockroom work spot. Shelving full of stock, a microwave and many devices all affect the signal. Check the five Wi-Fi standards.
- C Station C: Separate guest and staff access**  
Rename the network, replace the default admin password and choose staff security. Give guests their own network, test what guests and staff can reach, and listen to an open guest link.
- P Practice with a new setup**  
The shop changes: a wall moves, an older tablet arrives, or a till cannot reach the web. Find out which and fix it. Your real setup comes back afterwards.
- ✓ Final check**  
The game checks every device still has a unique valid address, every work spot has good Wi-Fi, and guests still cannot reach payroll. Everything from the stations must still work too.

## Key terms

**Switch:** joins devices inside one local network

**IP address:** a device's address on a network; two devices must not share one

**DHCP:** the service that hands out addresses automatically

**Access point:** a device that provides Wi-Fi

**Router:** forwards traffic between networks, such as the shop and the internet

**MAC address:** a fixed hardware identity for each network interface

**Gateway:** the router address a device uses to reach other networks

**WPA3:** current Wi-Fi security that encrypts the wireless link

## BEFORE YOU PLAY

1. What is the difference between a switch and a router? Guess before you play.

- ## 2. Why might Wi-Fi be strong by the door and weak at the back of a stockroom?

3. A café offers free Wi-Fi with a sign-in page. Is your traffic private on it?

## AFTER YOU PLAY

1. Local printing worked but the web did not (or the other way round) at some point. What did that tell you?

2. Why was one access point not enough? What else besides distance weakened the signal?

- ### 3. How did you prove guests could not reach payroll?

4. What did listening to the open guest link show? What does a sign-in page not do?

## YOUR NOTES



# Open to the world

Goal card: "Bring online orders back."

Where: the fulfilment office on a second pier: provider map, service port, browser terminal, two email desks and a packing lane.

## The situation

Online orders have stopped arriving. The fulfilment office has to choose an internet service, find where an order gets stuck on its way in, repair a browser that shows old prices and warnings, and get order emails to the right desks. All the websites, domains and mailboxes are fictional and stay inside the game.

## What you will do

- A Station A: Choose and trace the link**  
Pick an internet service that fits the shop's workload from the provider map. Trace an order request and fix the stage where it stops. Take a web address apart.
- B Station B: Repair the browser**  
Get checkout working on the browser terminal: an old catalogue, a certificate warning and a blocked payment script all stand in the way. Install an approved helper and remove the one nobody wanted.
- C Station C: Deliver the message**  
Send an order email and read it on both desks. Compare two ways of collecting mail. Load the HTTP and HTTPS demo, then place a test order that becomes a parcel.
- P Practice with a new setup**  
Online orders stop again. Trace it: sometimes the fix is here, and sometimes it is not. Your real setup comes back afterwards.
- ✓ Final check**  
The game traces an order again and tells you the stage where it would stop. Everything from the stations must still work too.

## Key terms

**ISP:** internet service provider

**DNS:** the service that turns a hostname into an IP address

**Cache:** saved copies of pages to load them faster; sometimes out of date

**SMTP, IMAP, POP3:** send mail; read mail kept on the server; download mail

**Bandwidth and latency:** how much data a link carries; how long a round trip takes

**URL:** a web address: scheme, hostname, path

**Certificate:** proof a website is who it says it is; it depends on the correct time

**HTTPS:** web traffic encrypted between the browser and the site

## BEFORE YOU PLAY

1. Fibre, cable, DSL, satellite, mobile: which do you think is best for a shop? Does it depend on anything?

2. What does it mean when a browser says a site's certificate is not valid? Should you click past it?

3. If you read an email on your phone, will it still be there on your laptop? What decides that?

## AFTER YOU PLAY

1. Which service did you choose, and what in the workload made others unsuitable?

2. At which stage did the order stop, and how did the trace tell you?

- ### 3. What was really behind the certificate warning?

- #### 4. Why did IMAP keep both desks in step? What changed with POP3?

5. What part of a URL does DNS look up? What part does it ignore?

## YOUR NOTES

# Cloud Hub

Cloud Hub is the data centre that the whole city depends on. Here you decide who gets the keys at headquarters (Level 11) and, at the very end, keep the city trading through a disaster (Level 15).

Lesson 11: Security Concepts

Lesson 15: Business Continuity



Cloud Hub, the data centre every other business comes to depend on.

## Levels here

| Level | Title                        | Goal card                    |
|-------|------------------------------|------------------------------|
| 11    | <b>Who gets the keys?</b>    | "Let the right people work." |
| 15    | <b>Keep the city trading</b> | "Keep the city trading."     |

## More to explore

Cloud Hub's older jobs include role badges and a shift test, a stolen-badge drill, an audit log, three incident drills, and backups, RAID, a UPS and recovery from ransomware and a flood.

When a level at a business is finished, the goal card may offer these older jobs, marked "more to explore". They are worth doing: many of them record extra skills in your journal.

# Who gets the keys?

Goal card: "Let the right people work."

Where: the HQ security wing beside Cloud Hub: a staff entrance with a badge reader, token pad and fingerprint pad, payroll and stock terminals, a document cabinet, a dispatch desk, a time-ruled delivery door and an audit log.

## The situation

Headquarters needs to let the right people work and keep everyone else out, without locking out the staff it depends on. Kai is starting a new job, some doors have time rules, a folder belongs to its owner, and an archive carries a central label. Then three incidents test the defences, and an audit log has to say who did what.

## What you will do

A

### Station A: Identity is not permission

Sign Kai in properly, then decide what he may do. Try different kinds of sign-in evidence, give out role keys and set permissions at the payroll terminal. Try single sign-on too.

B

### Station B: Model the rules

Set up roles, the delivery-door time rule, the folder owner's sharing and the archive's label, then test each with people who should and should not get in.

C

### Station C: Evidence and the three outcomes

Run three incident drills at the dispatch desk, check the seals, sort nine threat variants and read the audit log as evidence.

P

### Practice with a new setup

Kai changes role, someone tries single sign-on on an app they may not use, someone signs in with two passwords, or an old order is replayed. Your real setup comes back afterwards.

✓

### Final check

The game re-tests who is allowed and who is refused, and checks that replay protection, order signing and the standby replica are still on. Everything from the stations must still work too.

## Key terms

**Authentication:** proving who you are

**Factor:** a kind of sign-in evidence: something you know, have or are

**Single sign-on (SSO):** one sign-in that opens several apps

**Audit log:** a record of who did what and when

**Authorisation:** deciding what you are allowed to do

**Multi-factor:** two or more different kinds of factor, not two of the same kind

**Least privilege:** giving only the access a job needs

**CIA:** confidentiality, integrity and availability: three things security protects

## BEFORE YOU PLAY

1. Is a password plus a PIN "two-factor"? Why or why not?

2. Once a person has signed in, should they be able to open everything? Explain.

3. A record is read by the wrong person, a price is changed, a website goes down. How are these three problems different?

## AFTER YOU PLAY

1. Kai could sign in. What stopped him editing payroll?

2. Which rule was hardest to set so that the right people still got in?

3. For each drill, what was harmed: secrecy, correctness or being available?

4. What could the audit log show, and what could it not prove on its own?

## YOUR NOTES

# Keep the city trading

Goal card: "Keep the city trading."

Where: the continuity centre beyond Cloud Hub: a server room with a UPS, a rack, network storage and cartridges, a restore terminal with a spare host, and an alternate workspace with a plan board, a clipboard desk and an off-site vault.

## The situation

This is the last level. Every business on Harbour Island now depends on shared services, and something is about to go wrong. First you prepare, then a disruption hits, then you recover. It all runs on a safe exercise copy of the shop's own records, and time moves only when you act or wait, so there is no rush.

## What you will do

A

### Station A: Prepare before the incident

Prepare before the incident: decide what matters most, keep critical kit on backup power, add a second network path, back up files, the database and settings to separate places, prove a restore, and give each fallback duty to a person.

B

### Station B: Weather the disruption

Weather the disruption: keep trading through the power cut and the second problem, taking orders on paper when the tills cannot.

C

### Station C: Recover and reconcile

Recover and reconcile: restore in the right order, check the restored copy before it goes live, replay the paper orders once each, let the right people back in, make a new sale, and be honest about anything lost.

P

### Practice with a new setup

A different disaster: which copies can you still reach, and which one is valid? Your real setup comes back afterwards.

✓

### Final check

The game checks the continuity plan is ready and a checked recovery has been saved. Everything from the stations must still work too.

## Key terms

**Business continuity:** keeping a business running through a disruption

**Failover:** switching automatically to a spare link or system

**Replica:** a live copy that mirrors changes, mistakes included

**Restore:** bringing data back from a backup

**UPS:** uninterruptible power supply: a battery that keeps equipment running briefly

**Backup:** a separate, dated copy you can restore from

**Off-site:** kept in another place, so one disaster cannot take every copy

**Checksum:** a value computed from data, used to check a copy is intact

## BEFORE YOU PLAY

1. If the power went off in your school right now, what would stop, and what would carry on?

2. Why is a copy on the same computer not a real backup?

3. Which systems in a shop would you bring back first after a disaster? Why?

## AFTER YOU PLAY

1. What did you decide was critical, and what could wait?

- ## 2. Why did the replica not save you from every problem?

- ### 3. How did you know the restored copy was good before it went live?

4. Which orders, if any, were lost, and why could they not be brought back?

## YOUR NOTES

# Tips for playing well

## Experimenting is safe

Nothing in Startup City can be broken for good. A plug that does not fit simply goes back. Devices can be handed back to the tray without cost. Many panels preview a change before you commit it and offer Undo, and risky jobs keep a snapshot you can return to. Trying something and watching what happens is how the game is meant to be played.

## Look before you change

When something does not work, find out why before swapping things around. Read what the screen says, look at the lights, ask the person, and run the device's own test. The game rewards changes made for a reason, especially in the troubleshooting levels.

## Change one thing at a time

If you change three things and it starts working, you will not know which one mattered. Change one, test, then decide what to do next.

## Use the practice runs

A practice run changes the setup so that a memorised answer does not work. That is the point: it shows whether you understand why your first answer worked. Your real setup comes back when you finish or stop practising.

## Leave things working for the final check

The final check re-tests the world as it is now, not as it was. Before you press it, plug back in anything you unplugged during an experiment. If the check fails, it tells you what to fix.

## Hints are there to help

The first hint points you in a direction; later ones get more specific. Try the first before you ask for more.

## Come back for more

Older jobs marked "more to explore" and the Corner Market's extras teach things the levels do not. Your journal shows which skills you have shown so far.

## Play your way

If moving scenes are uncomfortable, turn on Reduce motion in Settings. If you prefer the keyboard or use a screen reader, press K. You can pause the city's people and traffic at any time.

# Glossary

The IT words used in the game and in this guide, in alphabetical order.

## Access point

A device that provides Wi-Fi.

## Algorithm

A set of steps that solves a problem.

## Application

A program for a task: word processor, spreadsheet, presentation, email.

## At rest and in transit

Data stored on a device; data moving over a network.

## Authentication

Proving who you are.

## Backup

A separate, dated copy you can restore from.

## Binary

Counting with two digits, 0 and 1; each place is worth twice the one to its right.

## Bluetooth pairing

Linking two wireless devices after checking they match.

## Bundled software

Extra programs an installer adds unless you untick them.

## Cache

Saved copies of pages to load them faster; sometimes out of date.

## Certificate

Proof a website is who it says it is; it depends on the correct time.

## CIA

Confidentiality, integrity and availability: three things security protects.

## Commit and undo

Make a change permanent; take back the last committed change.

## Computing cycle

Input, processing, storage and output.

## Condition (branch)

A test that decides which steps run.

## Constraint

A rule the database enforces, such as "quantity must be positive".

## Account

A sign-in identity; an administrator account can change the system.

## APIPA

A 169.254.x.x address a device gives itself when it cannot get one from DHCP.

## ASCII

A code that gives each English letter, digit and symbol a number from 0 to 127.

## Audit log

A record of who did what and when.

## Authorisation

Deciding what you are allowed to do.

## Bandwidth and latency

How much data a link carries; how long a round trip takes.

## Bit and byte

A bit is a single 0 or 1; a byte is eight bits.

## Boot order

The list of drives the firmware tries to start from.

## Business continuity

Keeping a business running through a disruption.

## Capability

Something a device can actually do, such as GPS, a camera or mobile data.

## Checksum

A value computed from data, used to check a copy is intact.

## Cloud

Services and storage run by someone else and reached over the internet.

## Compiled and interpreted

Translated before running; run step by step.

## Concurrent licence

A set number of people may use the software at the same time.

## Console

A text window where you type commands instead of clicking.

## CREATE, ALTER, DROP

Make a table, change its structure, remove the whole table.

**Data type**

The kind of value: integer, float, string, character, Boolean.

**DHCP**

The service that hands out addresses automatically.

**DNS**

The service that turns a hostname into an IP address.

**Driver**

Software that lets the operating system use a particular device.

**Escalate**

Hand a problem to someone who can fix it, with your evidence.

**Export and import**

Copy data out of a database and into another.

**Failover**

Switching automatically to a spare link or system.

**Final check**

The game re-tests your finished level before marking it complete.

**Firmware**

The small program on the motherboard that starts the computer.

**Foreign key**

A field that points at a primary key in another table.

**Gateway**

The router address a device uses to reach other networks.

**GRANT and REVOKE**

Give or take away a person's permission.

**Hertz (Hz)**

Cycles per second; 1 GHz is a thousand million cycles a second.

**HTTPS**

Web traffic encrypted between the browser and the site.

**Hypothesis**

Your best idea about the cause, which a test can support or rule out.

**IoT**

The Internet of Things: everyday objects with sensors that connect to a network.

**ipconfig**

A command that shows a computer's network settings.

**kB and KiB**

A kilobyte is 1000 bytes; a kibibyte is 1024 bytes.

**Known-good part**

A part you trust, used to rule something in or out.

**Database**

An organised, lasting store of records that many people can use at once.

**Divide and conquer**

Testing halves of a system to narrow down where a fault is.

**Document store**

A store for records whose shape varies, such as nested lists.

**Encryption**

Scrambling data so only someone with the key can read it.

**Evidence (in the game)**

Something you really did and the game verified, recorded in your journal.

**Factor**

A kind of sign-in evidence: something you know, have or are.

**File system**

How a drive organises files: FAT32, exFAT, NTFS, Ext4, HFS.

**Firewall**

A filter that allows only the network traffic you choose.

**Flat file**

One file of data, like a spreadsheet, with no rules or links.

**Function**

A named, reusable piece of a program.

**GPU**

The graphics processor; it speeds up some jobs, not all.

**HDMI**

A common digital video and audio connector.

**Hexadecimal (hex)**

Counting in sixteens with 0–9 and A–F; two hex digits make one byte.

**Hypervisor**

Software that runs several operating systems as guests on one machine.

**Intellectual property**

Creations protected by law, such as copyright and trademarks.

**IP address**

A device's address on a network; two devices must not share one.

**ISP**

Internet service provider.

**Key/value store**

A store that finds a value directly from its key.

**Least privilege**

Giving only the access a job needs.

**Licence**

The permission to use software: per device, per person, per site, by subscription, open source.

**Loop**

Repeating steps, for example once for each product.

**Malware**

Software designed to harm or spy.

**Modem**

The box that connects a building to the provider's line.

**NAS**

Network-attached storage: a drive other computers reach over the network.

**nslookup**

A command that asks DNS for a hostname's address.

**Operating system (OS)**

The software that runs a device and shares it between programs and people.

**Paging**

Moving data between RAM and the disk when RAM is full; it makes work slow.

**Patch**

An update that fixes a security weakness.

**Permission**

A rule saying who may read or change a file or folder.

**Ping**

A test that asks another device to reply, to see if it can be reached.

**Plug and play**

A device that works as soon as it is connected.

**Practice run**

A changed copy of a level; your real setup comes back afterwards.

**Process**

A running program; Task Manager can end one that has hung.

**Query**

A question put to a database, such as "which products have stock below 5?".

**RAM**

The computer's working memory; fast, but emptied when the power goes.

**Replica**

A live copy that mirrors changes, mistakes included.

**Restore**

Bringing data back from a backup.

**Local, LAN and cloud apps**

Apps that run on the device, on the office network, or over the internet.

**MAC address**

A fixed hardware identity for each network interface.

**Mbps**

Megabits per second, a measure of how fast data moves.

**Multi-factor**

Two or more different kinds of factor, not two of the same kind.

**NFC**

Near-field communication: a very short-range wireless link, used for tap-to-pay.

**Off-site**

Kept in another place, so one disaster cannot take every copy.

**Operating system image**

A ready-made copy of an operating system to install on a device.

**Password manager (vault)**

An app that makes and keeps long, unique passwords.

**Peripheral**

A device added to a computer, such as a printer, scanner or display.

**Phishing**

A message that tricks you into giving away access or money.

**Platform**

The operating system and processor an app is built for.

**Port**

The socket a cable plugs into; its shape and what it carries both matter.

**Primary key**

A field whose value is unique to each record.

**Pseudocode and flowchart**

Ways of writing or drawing a program's logic.

**RAID 1**

Two drives holding the same data, so one can fail without loss.

**Ransomware**

Malware that locks or encrypts data and demands payment.

**Reproduce**

Make the problem happen again on purpose to see it clearly.

**RF receiver**

A small plug-in radio that talks to one wireless device.

**Rollback**

Undoing a change that made things worse.

**SELECT, INSERT, UPDATE, DELETE**

Read rows, add rows, change rows, remove rows.

**Server**

A computer built to serve many others and stay on day and night.

**Single sign-on (SSO)**

One sign-in that opens several apps.

**SQL**

Structured Query Language, used to ask and change a database.

**Switch**

Joins devices inside one local network.

**Table, record, field**

A table holds records (rows); each record has fields (columns).

**Tier**

A layer of a system, such as the screen, the logic and the database.

**Unicode and UTF-8**

A code for the characters of every language; UTF-8 stores it in one to four bytes.

**URL**

A web address: scheme, hostname, path.

**Variable and constant**

A named value that can change; one that cannot.

**WHERE**

The condition that picks which rows a command affects.

**x86 and ARM**

Two families of processor; a program must be built for the right one.

**Router**

Forwards traffic between networks, such as the shop and the internet.

**Self-test**

A check a device runs on itself, such as a printer printing its own test page.

**Service**

A program that runs in the background, such as the print spooler.

**SMTP, IMAP, POP3**

Send mail; read mail kept on the server; download mail.

**Storage**

Where files are kept when the power is off: SSD, hard disk, flash, disc.

**Symptom and cause**

What you notice; what is really wrong.

**Teacher mode**

A setting that opens every business and level at once.

**Timeline**

What happened, in order, linked to the evidence.

**UPS**

Uninterruptible power supply: a battery that keeps equipment running briefly.

**USB-A, USB-B, USB-C**

Three USB plug shapes; USB-C sockets do not all carry video.

**VPN**

An encrypted tunnel for network traffic.

**WPA3**

Current Wi-Fi security that encrypts the wireless link.

## CHECKLIST

# My progress tracker

Tick each part when the game shows it done. The lesson column links each level to the Wikiversity IT Fundamentals course.

| Level | Title and business                            | A                        | B                        | C                        | Practice                 | Check                    | Date |
|-------|-----------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------|
| 1     | <b>Opening day</b><br>Corner Market           |                          |                          |                          |                          | <input type="checkbox"/> |      |
| 2     | <b>The delivery team</b><br>Byte Repair       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 3     | <b>The slow studio</b><br>Byte Repair         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 4     | <b>The busy counter</b><br>Corner Market      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 5     | <b>A place for everyone</b><br>Head Office    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 6     | <b>Tools of the trade</b><br>Head Office      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 7     | <b>Orders in order</b><br>Stockroom           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 8     | <b>The stockroom rush</b><br>Stockroom        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 9     | <b>Across the street</b><br>Harbour Branch    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 10    | <b>Open to the world</b><br>Harbour Branch    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 11    | <b>Who gets the keys?</b><br>Cloud Hub        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 12    | <b>A safer working day</b><br>Head Office     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 13    | <b>Make it automatic</b><br>Stockroom         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 14    | <b>The morning breakdown</b><br>Corner Market | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 15    | <b>Keep the city trading</b><br>Cloud Hub     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |

## The fifteen lessons

Every lesson of Wikiversity's IT Fundamentals course is played somewhere on Harbour Island. Tick a lesson when your journal shows skills for it.

| Lesson                                          | Where         | Shown in my journal |
|-------------------------------------------------|---------------|---------------------|
| <input type="checkbox"/> <b>1. Introduction</b> | Corner Market |                     |

|                          | Lesson                   | Where          | Shown in my journal |
|--------------------------|--------------------------|----------------|---------------------|
| <input type="checkbox"/> | 2. Devices               | Byte Repair    |                     |
| <input type="checkbox"/> | 3. Components            | Byte Repair    |                     |
| <input type="checkbox"/> | 4. Peripherals           | Corner Market  |                     |
| <input type="checkbox"/> | 5. Operating Systems     | Head Office    |                     |
| <input type="checkbox"/> | 6. Applications          | Head Office    |                     |
| <input type="checkbox"/> | 7. Database Concepts     | Stockroom      |                     |
| <input type="checkbox"/> | 8. Database Use          | Stockroom      |                     |
| <input type="checkbox"/> | 9. Networking            | Harbour Branch |                     |
| <input type="checkbox"/> | 10. Internet             | Harbour Branch |                     |
| <input type="checkbox"/> | 11. Security Concepts    | Cloud Hub      |                     |
| <input type="checkbox"/> | 12. Security Practices   | Head Office    |                     |
| <input type="checkbox"/> | 13. Software Development | Stockroom      |                     |
| <input type="checkbox"/> | 14. Troubleshooting      | Corner Market  |                     |
| <input type="checkbox"/> | 15. Business Continuity  | Cloud Hub      |                     |