

LESSON 14

The Internet and Web Technologies

40 minutes

Foundations of Computer Science

Outcome 2.15

Outcome 1.22

Outcome 2.20

Outcome 3.11

Outcome 3.13

Outcome 3.14

Outcome 1.23

WHAT THIS LESSON DOES

In this lesson, you'll explore the basics of how the internet and web technologies work. Learn the difference between the internet and the World Wide Web, understand key concepts like the client-server model, and try a practical activity with micro:bit.

CURRICULUM OUTCOMES

Outcome	What the specification asks for
2.15	explain what is meant by the World Wide Web (WWW) and the Internet, including the client server model, hardware components and communication protocols
1.22	read, write, test, and modify computer programs
2.20	identify and fix/debug warnings and errors in computer code and modify as required
3.11	use and control digital inputs and outputs within an embedded system
3.13	develop a program that utilises digital and analogue inputs
3.14	design automated applications using embedded systems
1.23	reflect and communicate on the design and development process

WHAT STUDENTS SHOULD BE ABLE TO DO

- Understand the fundamental differences between the internet and the World Wide Web (WWW).
- Grasp the concept of the client-server model and its role in networking.
- Identify key internet protocols such as HTTP, TCP, IP, and VOIP and their functions.
- Recognise the components of web infrastructure that enable global connectivity.
- Apply networking concepts through practical simulation of client-server communication.

BEFORE THE LESSON

- Have two micro:bits per pair charged and cabled, and confirm makecode.microbit.org loads and flashes through the school filter on a test machine.
- Paste both the client and server code blocks somewhere the class can copy from, as the descriptions here are truncated. Build and flash both once yourself so you know the radio group and button trigger behave.

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HOW THE LESSON RUNS

Introduction

Understanding the Internet and WWW

The Client-Server Model

Key Protocols: HTTP, TCP, IP, and VOIP

Web Infrastructure

Practical Activity: Simulate Client-Server with Micro:bit

Wrap Up

TEACHING MOVES

- 2. Understanding the Internet and WWW. Push the roads-versus-vehicles analogy hard: the internet is the infrastructure, the web is one service running on it. Ask what other services also use the internet but are not the web, drawing out email and VOIP.
- 3. The Client-Server Model. Walk one concrete request through aloud: browser as client sends a request, server processes it, response comes back. Name your own school's setup if you can, so the model is not purely abstract.
- 4. Key Protocols: HTTP, TCP, IP, and VOIP. Frame a protocol as an agreed set of rules, not a piece of software. Split the roles clearly: HTTP carries web pages, TCP/IP handles reliable transmission and addressing, VOIP carries voice.
- 5. Web Infrastructure. Keep this grounded in objects students can picture: data centres, routers, switches, cables. Ask where the YouTube video they just watched physically lived before it reached the screen.
- 6. Practical Activity: Simulate Client-Server with Micro:bit. Make the mapping explicit before they code: pressing A on the client is the request, the server's reply is the response. Insist both micro:bits share the same radio group or nothing arrives.

WHAT TO WATCH FOR

- Students treat internet and World Wide Web as the same thing. Return to the analogy and ask them to place email, streaming and VOIP: all use the internet, none are the web. The web is one service among several.
- Students think a protocol is a program you install rather than a shared set of rules. Compare it to the etiquette of a phone call: both sides agree how to start, take turns and end. No app is installed, the rules are just followed.
- In the micro:bit activity, students set different radio groups and get no response, then assume their code is broken. Have them check both micro:bits call `radio.setGroup` with the same number before touching anything else. It is almost always the cause.

DIFFERENTIATION

- Emerging: If the micro:bit will not flash, pair the student with a working setup so they still see the request-response exchange happen. Give them the one-line summary to hold onto: internet is the roads, web is the traffic.
- Developing: Ask them to narrate what happens on each micro:bit in client-server language before you accept it as working. Have them label which protocol would carry each part of a real web request.
- Proficient: Ask them to extend the simulation so the server sends a different reply depending on the message received, and explain how this mirrors an HTTP request and response. Have them explain at Higher Level why TCP and IP are separate layers doing different jobs.