

Supercomputer coding

Overview

Computers are all around us. From the PC or laptop some people have at home, to the games consoles, smart phones or tablets we can hold in our hands.

At the Met Office, we don't just have any computer, we have a supercomputer. Actually, we have three! In this activity you'll learn about our supercomputer and you'll have chance to take part in coding with coding with objects around your home or classroom.



Time required

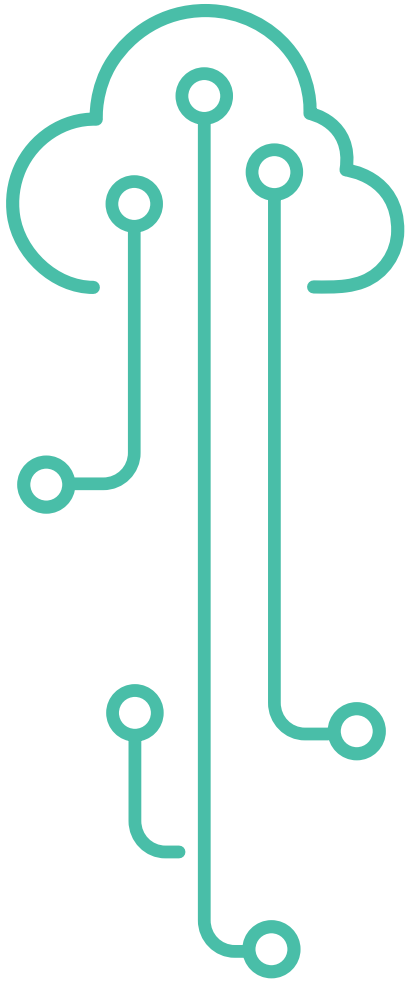
60 minutes



Materials required

- A range of objects you can group into three different colours (Lego works really well)
- Binary Alphabet information sheet (see below)
- Objects for a memory game
- Internet





Activity Steps

01 What makes our computer super?

Firstly, we are going to focus on three main parts of the Met Office supercomputer.

The Processor

Computers have a processor which is an electrical circuit which can process information. This could be to perform a calculation or control another device such as the colour of a pixel on a screen. Our supercomputer can do 16,000 trillion calculations per second, that's 2 million calculations for every person on the planet, every second!

It has 460,000 cores (Central Processing Units, or CPUs).

It weighs 110 tonnes - as much as nine double decker buses!

Memory

Computers have a memory and disk system for storing information. This information can then be retrieved by the processor when it is needed. Larger stores take longer to access than smaller memory stores. You can look at this in terms of comparing it to your table or desk at home or at school, where pieces of paper or items you are working with are on your desk (where they are quick and easy to access but there is limited space), and other things are in drawers/cupboards (where it takes longer to access but there is more space).

Test your memory time! Get some random objects from around your house or classroom, make sure you have something to cover them up with. Put all the objects on a tray and give your family/friends 20 seconds to look at the objects before they get covered up again.

Get them to recite back the objects they can remember. Reveal them to your friends afterwards and count how many they got right.

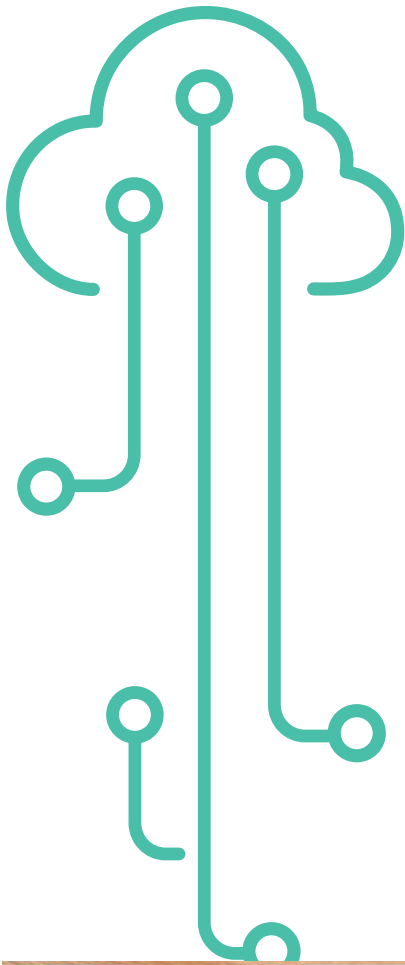
The Met Office supercomputer has a vast memory. It has 1.6 million Gigabytes of memory for its calculations – more than 100,000 times the memory of a smart phone.

It has 23 petabytes (23 million gigabytes) of storage to save data - enough to store over 100 years' worth of HD movies!

Power

Computers need electrical power to move the data around the electronic circuits.

Our supercomputers use 1.5 Mega (million) Watts! That is enough energy to lift two elephants onto the roof every second!



02 Let's have a look at writing some code to talk to the computer!

With all the information above, let's have a look at how a computer reads different messages and try to make our own.

When a computer is being told what to do it does not use letters, but numbers. Each letter, number or symbol is converted into a series of binary digits or "bits".

As you work with them in software on a computer you will need to learn to communicate in computer language to tell computers what to do.

At the bottom of this page you will find a binary alphabet decoder. You will see that each letter of the alphabet is represented by a series of 1s and 0s. In fact, each letter is made up of eight "bits".

Can you write your name using the below binary alphabet using different coloured bricks/objects or using crayons? You'll need 2 colours, one to represent the 0 and another to represent 1.

You can see from the Lego photo that red and pink have been used. Red for 0 and pink for 1 with green as the spaces between the letters. Using the alphabet decoder can you find out what the word is?

Answer - it says 'hi'

Tip

Lego is great to use for this, 1x1 bricks! Think about using a different coloured brick or object for the spaces in the letters/words you decide to make.

Binary Alphabet		
a - 01000001	j - 01001010	s - 01010011
b - 01000010	k - 01001011	t - 01010100
c - 01000011	l - 01001100	u - 01010101
d - 01000100	m - 01001101	v - 01010110
e - 01000101	n - 01001110	w - 01010111
f - 01000110	o - 01001111	x - 01011000
g - 01000111	p - 01010000	y - 01011001
h - 01001000	q - 01010001	z - 01011010
i - 01001001	r - 01010010	

03 Once you have completed this task, have a go at making a secret message to one of your family or friends for them to decode!

If you'd like to find out more about our supercomputer you can find it [here](#).