

# Understanding Data with Capgemini

## A guide to delivery



### Introduction

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This project introduces students to data – how it is represented, the difference between digital and analogue data, how compression works, and data storage. It also poses a challenge – find a location for a new data centre, taking into account multiple variables around sustainability, power, transport and communications. The Capgemini team are keen to see any proposals for a location, and there could be a prize for the best solution!

Along the way students complete a Student Log, based upon the steps in the e-learning content, assessing their understanding of binary, data representation, storage and the cloud, and the importance and personal relevance of data centres. They are introduced to industry use of data centres by organisations such as Apple, Google, Facebook and Microsoft. The environmental impact of data centres, and technology in general, is a theme that runs through the project.

### Earning Open Badges for work on this project

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The Tech Partnership Badge Academy is directly aligned to the TechFuture Classroom. You can find the Badge Academy by clicking on the Badges link at the top of the Learning Hub window.

Within each TechFuture Classroom project, badges are available for students to earn for the work they complete within the projects. In this project, there are two available badges, one earned by completing the e-learning and the second for the location proposal. These are:

**Capgemini Understanding Data** – automatically awarded when students complete the main e-learning module

**Capgemini Data Centre Locator** – awarded when students complete the task to find a location for a data centre, explaining their idea with reference to the variables discussed by Matthew Bradley in the e-learning module. This is teacher verified, and we issue a code that students can upload to the site when you are happy with the evidence presented. Further information about the criteria for this badge is available at the end of this document.

### Resources provided

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On the course page, there is a bank of resources underneath the e-learning module that scroll using the arrows at each end of the row. You are provided with the following resources:

- > The e-learning module which students can work through individually in the classroom or at home
- > Student Log for completion either electronically (MS Word version) or by hand (PDF)
- > Documents that support the concepts introduced in the e-learning including the binary system, data representation, compression and storage, and a case study of the Facebook Arctic data centre

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You will also see on the course page for this project a set of additional Open Badges that Capgemini support, which are not directly associated with this project but are valuable to students who are developing their communication and employability skills.

**There is a completed exemplar Student Log available free to teachers, which includes model responses to the activities and a marking scheme. For a copy of this log, email [helpdesk@techfuture.com](mailto:helpdesk@techfuture.com) using your school email address.**

## Steps in the e-learning content

The following table shows the steps through which students are guided to understand firstly more about data and then much more about data centres and their location.

Steps in the e-learning content	Resources
Meet Matthew Bradley and hear the challenge to find a location for a data centre	Videos of Matthew, who works at Capgemini within Sustainability for IT
Analogue and Digital Data	Tab activity that explains analogue data, digital data, digital to analogue and analogue to digital data conversion.  <b>Resources:</b> Document that further explains this <b>Student Log:</b> Complete Activity 1 which fills in the blanks on a piece of writing about analogue and digital data.
Knowledge check of digital and analogue data	True/false activity to check understanding
Data representation and the binary system	Image exploration to demonstrate the binary system  <b>Resources:</b> Using Binary document <b>Student Log:</b> Complete Activity 2 on understanding and using binary
More about binary	Hotspot activity to find out more about binary
Knowledge check on binary	Multiple choice quiz
Bits, nibbles and bytes	Tab activity to find out more about storage capacity and what is meant by bits, nibbles, bytes and multiple bytes  <b>Resources:</b> Bits, Nibbles and Bytes document <b>Student Log:</b> Complete Activity 3 on Bits, Nibbles and Bytes
Knowledge check of multiples of bytes	Ordering activity for megabytes to exabytes
Compressing data	Image exploration for storage of media – video, images, sounds and files  <b>Resources:</b> Sounds, videos and images document <b>Student Log:</b> Complete Activity 4, checking on the size of own files of music, images and documents  Complete Activity 5, multiple choice activity on sounds, image and video compression



Steps in the e-learning content	Resources
Storing data and the cloud	<p>Hotspot activity to explore cloud computing and what can be stored in the cloud</p> <p><b>Student Log:</b> Complete task 6 by calculating how much space Apple needs to accommodate its 500 million account holders' storage.</p>
What a data centre is	Set of videos where Matt talks about data centres, infrastructure and outsourcing
Understanding data centres and the cloud	True/False quiz on outsourcing, datacentres and the cloud
Factors that influence locations of data centres	<p>Set of four videos where Matt talks about sustainability, energy consumption and transportation and accessibility</p> <p><b>Resources:</b> document on Brownfield and Greenfield sites</p> <p><b>Student Log:</b> Complete task 7 by thinking about local Brownfield and Greenfield sites and their suitability as a location for a data centre</p>
Understanding more about the first few variables	Tab activity to explore more about sustainability, transport and accessibility
More variables to consider	<p>Set of four videos where Matthew talks about communications, security, heat generation and cooling and power security</p> <p><b>Student Log:</b> Complete task 8 by thinking about the best energy sources for the data centre from traditional and renewable sources</p>
Understanding more about the next variables	Tab activity to explore further communication, security, cooling and power security.
The final two variables	Two more videos that talk about terrorism and its threat, as well as the sustainability and future life of the data centre
Understanding the final variables	Tab activity to explore further terrorism and sustainability longer term
Finding the ideal location	<p>Summary of the brief, how to find the ideal location for a data centre making use of the variables presented by Matt, and how to present these in a report or presentation.</p> <p><b>Student Log:</b> Activity 9 – table to help students think about sites that could work by rating them against the variables.</p>
Final quiz	True/false quiz to complete the module



## Timings for delivery

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TechFuture Classroom projects are built for flexibility and different ways of use.

Students can work through the e-learning, completing the activities in the Student Log as they progress.

Students just using the e-learning module, without completing the Student Log, could complete this within one lesson (50 minutes) and homework. The regular knowledge checks throughout the e-learning assess students' understanding. Completion of this module awards students automatically with the Capgemini Understanding Data badge.

Students who complete the project by working through the additional tasks in the Student Log will require two lessons with homework, and opportunities to work together on the data centre location task. Students who successfully identify a location for the data centre, and complete a document or presentation that explains this decision can be awarded the Capgemini Data Centre Locator badge. This badge is awarded through your verification of completion of the work. We issue a code that is changed monthly for students to insert into the site to gain the badge. See below for the badge criteria.

Note, for individual award of badges students must be logged into their own account.

Email [helpdesk@techfuture.com](mailto:helpdesk@techfuture.com) for the badge code, and for a copy of the completed Student Log for assessment purposes. We are also keen to hear from you if your students would like their proposal for the data centre to be submitted to Capgemini. We will be happy to share their ideas and presentation/report with the Capgemini team.

## Flipped classroom delivery

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It is possible to use TechFuture Classroom projects for flipped classroom delivery. When students have their login details, they can access the platform at any time from home and school. Students could complete the e-learning at home, and come to class to complete the data centre location activity within small groups.

## Awarding the Data Centre Locator badge

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Although most of the badges on the Tech Partnership Badge Academy are automatically verified by the system, for completion of e-learning materials, some require your input to verify evidence that the student has completed a task. The Capgemini Data Centre Locator badge requires that input.

For this badge, we expect that students have:

1. Demonstrated they have considered all the variables in finding a suitable location for a data centre
2. They have identified a suitable site that is Brownfield, or – if no Brownfield sites are suitable in the local area – a Greenfield site and justified its choice
3. Produced a short presentation or a report that explains the choice, and how it covers as many of the variables as possible

Thank you for taking time to verify your students' evidence so they can gain this badge.

If you have questions or queries about this project, contact [helpdesk@techfuture.com](mailto:helpdesk@techfuture.com) and we will do our best to respond within 48 hours.