

Cloud Technologies

How to use ...?

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WHAT WE WILL LEARN

- Intro to cloud
- Security
- Examples and case studies
- Cost and implications
- Intro to Google Earth Engine

Introduction to Cloud

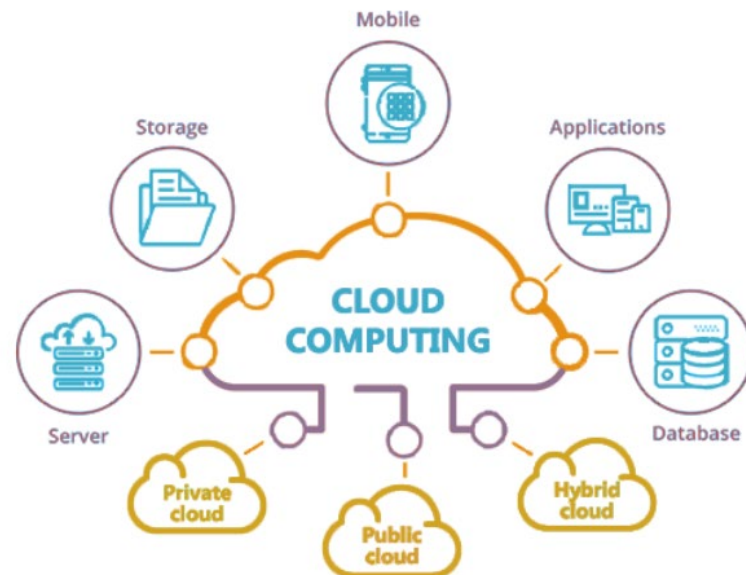
What is the cloud?

- Information accessed via the web.
- Desktop computers, laptops, tablets, mobile devices, TV's



What is cloud computing?

- A method of using shared resources hosted elsewhere to deliver a function
- email, data storage etc...
- The resources of these applications are hosted in the cloud.



Functionality of cloud computing

- Functionality that uses internet based resources
- Only the interface dealt with on the client side
- Software as a service - SaaS



Who is cloud suitable for?

- Long established, large businesses
- Scientific community
- Everyone in between



Connectivity

- Depending on your internet connection Cloud Computing may not be an option (2Mbps + is fine)
- Alternatives can be installed, hosted and run from your location
- This may be a better if you are in a remote location or do not have access to fast broadband



Integration

- Cloud technologies provide a wide range of services and capabilities that enable organizations to build, deploy, and manage applications and infrastructure more efficiently.
- The integration abilities of cloud technologies vary depending on the specific services and platforms involved.

e.g APIs, Serverless Computing, Database Integration, Analytics and

Monitoring Integration...

Cost Savings?

- No nominal start up costs
- No server to buy or maintain
- No manual installation
- No IT staff
- No maintenance



Cutting-edge



Software update? Just refresh your browser!

- Cutting-edge technology
- No manual updates
- Competitive industry
- Fast moving technology
- Pushing boundaries

Alternatives to public cloud storage

- External hard drive
- Private Cloud
- Virtual Private Networks (VPN)



Security

Cyber Security

- `https://` - secure connection
- Secure connections used for websites exchanging sensitive data
- Strong passwords



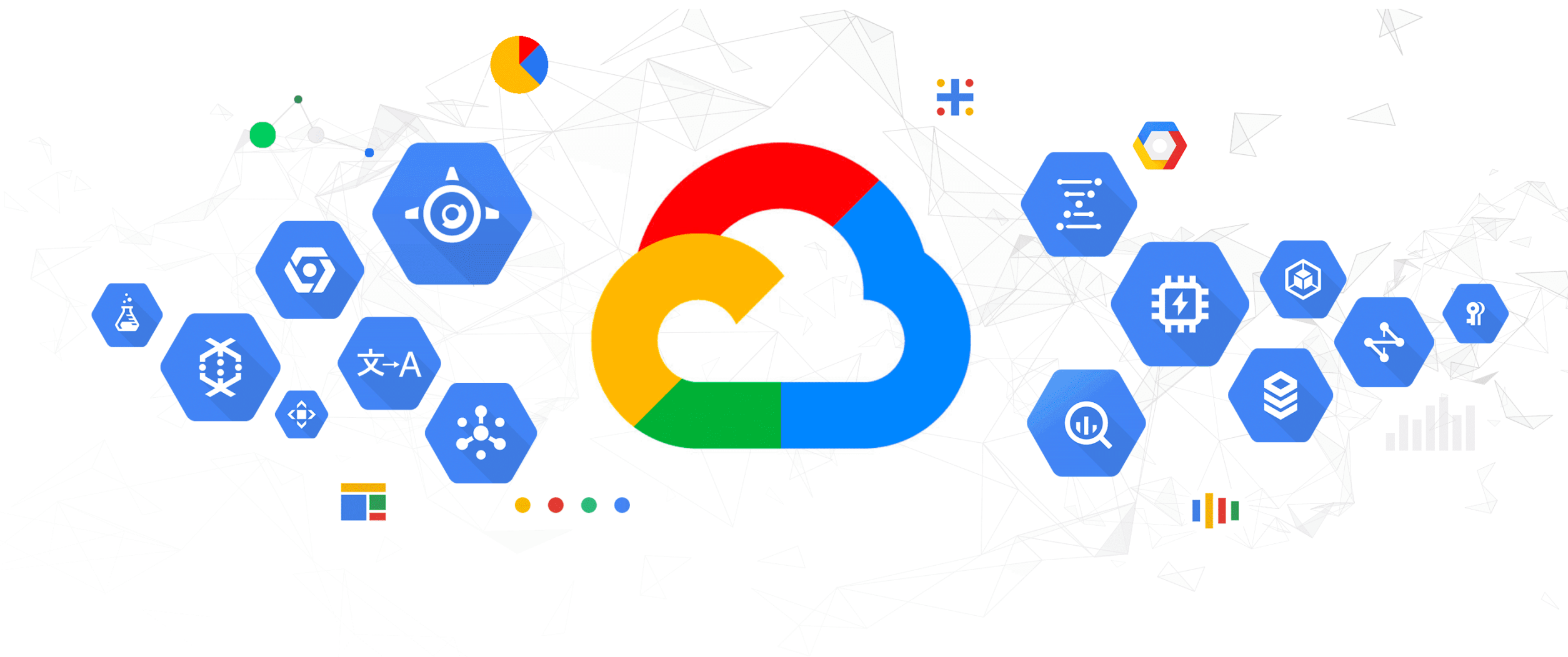
2-Step Verification

Secure login



- Used by most cloud based applications
- 2 steps - username and password then using another device

Real-world examples

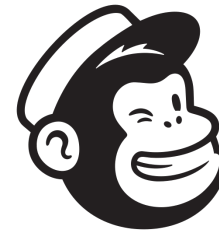




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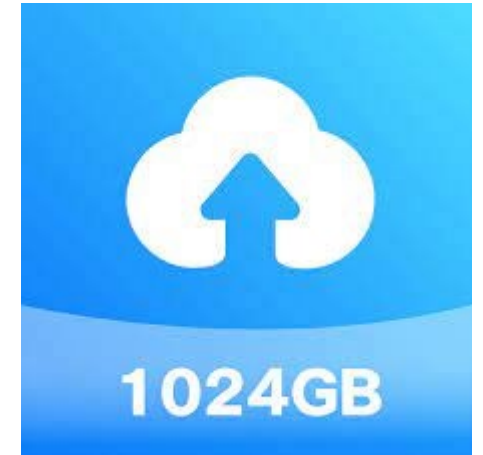
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ESRI

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Mapping and analysis: location intelligence for everyone



AIRBUS



Trimble
Connect



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Labs



sentinelhub

planet.



Google Earth Engine

Google Earth Engine

Chapter 1. Introduction to Cloud

This chapter introduces the Google Earth Engine application programming interface (API) and the JavaScript syntax needed to use it. You will learn about the Code Editor environment and get comfortable typing, running, and saving scripts. You will also learn the basics of JavaScript language, such as variables, data structures, and functions.

Learning Outcomes

- Familiarity with the Earth Engine Code Editor.
- Familiarity with the JavaScript syntax.
- Ability to use the Earth Engine API functions from the Code Editor.

Assumes you know how to:

- Sign up for an Earth Engine account.
- Access the Earth Engine Code Editor.

The Earth Engine API

Google Earth Engine is a cloud-based platform for scientific data analysis

- ready-to-use
- cloud-hosted datasets
- large pool of servers

Language

Google provides official client libraries to use the API from both...

- JavaScript
- Python

Why JavaScript?

- JavaScript may not be the first choice of programming language for many researchers and data scientists
- Some may be wondering why we are using the JavaScript API instead of Python or R?

Why JavaScript?

- The Earth Engine JavaScript API is the most mature and easiest to use when getting started.
- The Earth Engine platform comes with a web-based Code Editor that allows you to start using the Earth Engine JavaScript API without any installation.

Practicum 1:

Getting Started in the Code Editor

Assignment 1

```
var mission = ee.String('Sentinel');
```

```
var satellite = ee.String('2A');
```

```
// Concatenate the two strings using the cat function
```

```
var result = mission.cat(satellite);
```

```
// Print the result in the Console
```

```
print(result);
```

Chapter 2. Exploring Images

Satellite images are at the heart of Google Earth Engine's power. This chapter teaches you how to inspect and visualize data stored in image bands. We first visualize individual bands as separate map layers and then explore a method to visualize three different bands in a single composite layer. We compare different kinds of composites for satellite bands that measure electromagnetic radiation in the visible and non-visible spectrum. We then explore images that represent more abstract attributes of locations, and create a composite layer to visualize change over time.

Learning Outcomes

- Using the Code Editor to load an image
- Using code to select image bands and visualize them as map layers
- Understanding true- and false-color composites of images
- Constructing new multiband images.
- Understanding how additive color works and how to interpret RGB composites.

Assumes you know how to:

- Sign up for an Earth Engine account, open the Code Editor, and save your script.

Practicum 2:

Image visualization

Assignment 2

```
Map.addLayer(  
  first_image,  
  {  
    bands: ['SR_B4', 'SR_B3', 'SR_B2'],  
    min: 8000,  
    max: 17000  
  },  
  'False Color');
```

Gracias

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