

Project 7: LoRa-Network for connected objects

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Expansion of Connected Objects

- Increasing number of connected objects worldwide;
- Over 75 billion by 2025!
- Incorporated into our daily lives.



Objective:

Design a network of connected devices with the use of LoRa and various sensors to monitor a room's environment;

Comparative study of different solutions for the connected object network.

Table of contents



1. Project Management
2. Embedded System
3. The Things Network (TTN)
4. Data
5. Comparative Study
6. Services

1. Project Management

Team Presentation



Evolution over the course of the project

1. Project Management

Team Presentation



Evolution over the course of the project

1. Project Management

Work Methodology

□ Agile Method :

- Responsive to the client's requests
- Weekly meetings with the client:
 - Present the project's progression
 - Establish future tasks
- Involve the client in the improvements of the specifications.

1. Project Management

Management Tools



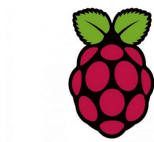
- **Trello : Project Management Tool**
 - Assign tasks
 - Set deadlines
 - Follow the project's progress
- **Slack : Communication Tool**
 - Discussion for each group
 - Share meeting schedules, important information
 - Share documents and notes

2. Embedded System

Objective

- Collect information to monitor a room's environment:
 - Temperature
 - Pressure
 - Humidity

Composition



Raspberry Pi
Embedded Linux
System



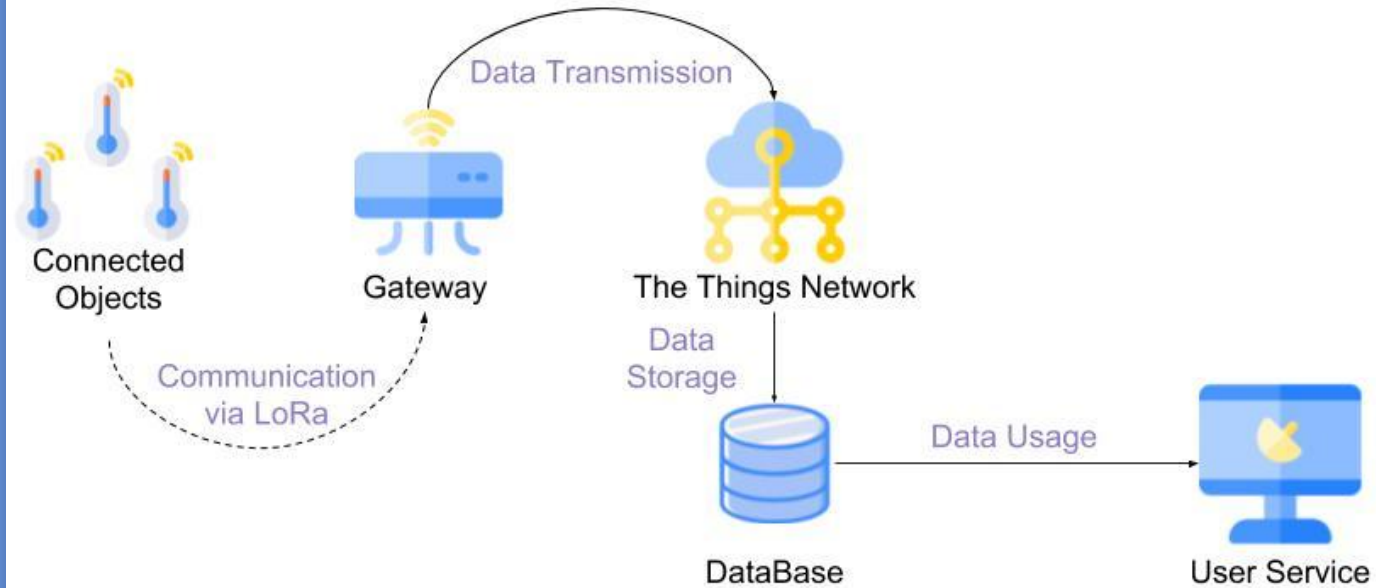
SenseHat
Sensors Shield



Chistera PI
LoRaWAN Shield

2. Embedded System

Communication Chain



3. The Things Network

- ❑ Open source cloud infrastructure
- ❑ Create a TTN account



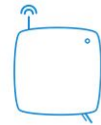
Learn about LoRaWAN: the secure messaging protocol used by The Things Network.

Devices



Connect devices to The Things Network.

Gateways



Extend The Things Network by installing a gateway.

Network



Manage your applications and devices.

Applications

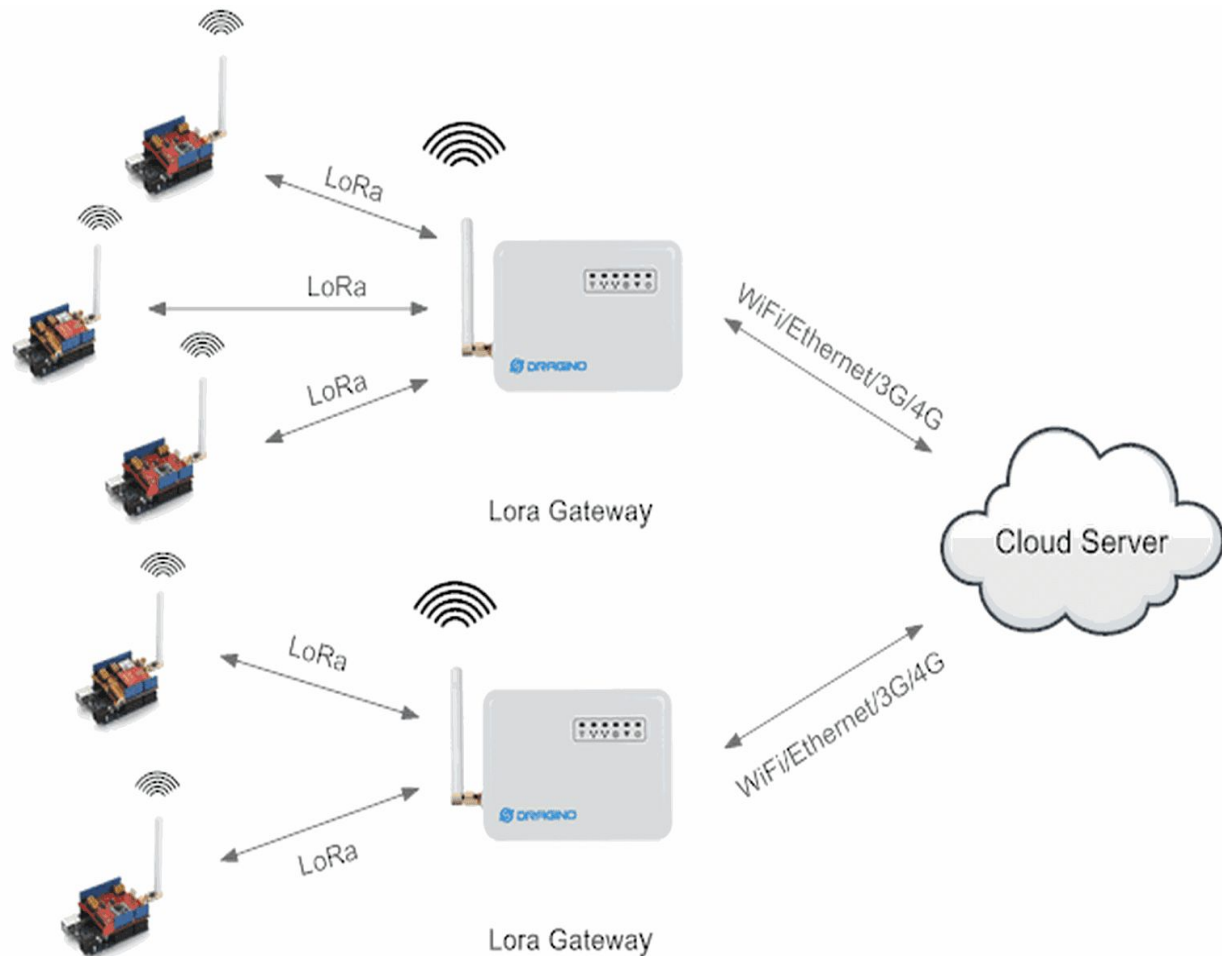


Build applications on The Things Network.



3. The Things Network

Gateway Role



3. The Things Network

Adding devices to TTN

REGISTER DEVICE

Device ID

This is the unique identifier for the device in this app. The device ID will

my-sensordata-lorawan

Device EUI

The device EUI is the unique identifier for this device on the network. You

70 B3 D5 70 50 00 2A C7

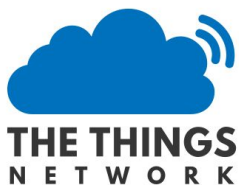
App Key

The App Key will be used to secure the communication between you de

95 CE 4A 20 00 00 00 00 00 00 00 00 00 00 00 26 87 E3

App EUI

70 B3 D5 70 50 00 00 02



4. Data

Data gathering

- API Handlers

HTTP

MQTT

- Software Developers Kits (SDKs)

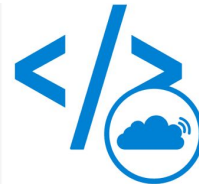


- Integration



Azure IoT Hub

AWS



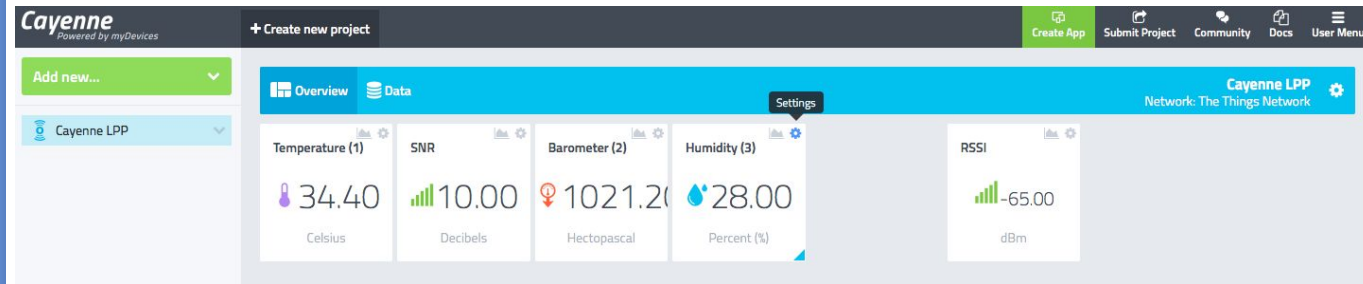
Cayenne

4. Data

Integrations

Cayenne

- MQTT Protocol



4. Data

Integrations

Firebase

- HTTP Protocol



Advantages

5. Comparative Study

MQTT-Cayenne



- A mobile application -
Real time data;
- Easy integration;
- Pre Implemented Interface;
- A rule engine;
- Graphical input / output management.

HTTP-Web/Mobile Application Firebase

- Real time data;
- Easy integration;
- Freedom in adding features;
- Free implementation of the visual interface.

5. Comparative Study

Disadvantages

MQTT-Cayenne







- Predefined components;
- Unable to add features;
- 2 devices = 2 Cayenne accounts.

HTTP-Web/Mobile Application Firebase

- Longer implementation (implementation of the Web application + request to the database);
- Interface setup required.

5. Comparative Study



- Smart Home Action  IoT   Limitations Lorawan Protocol
- Requests on an API endpoint: Get/Post requests  TTN Gateway

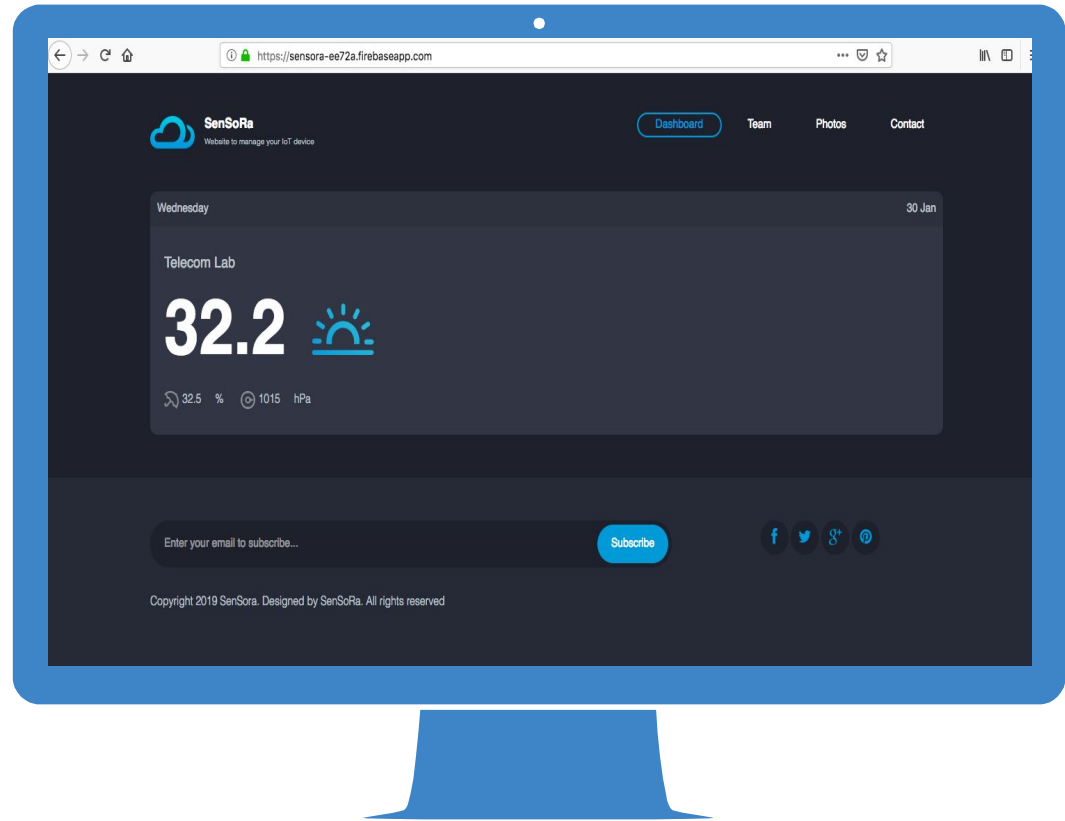
6. Services

Demonstration of our services



6. Services

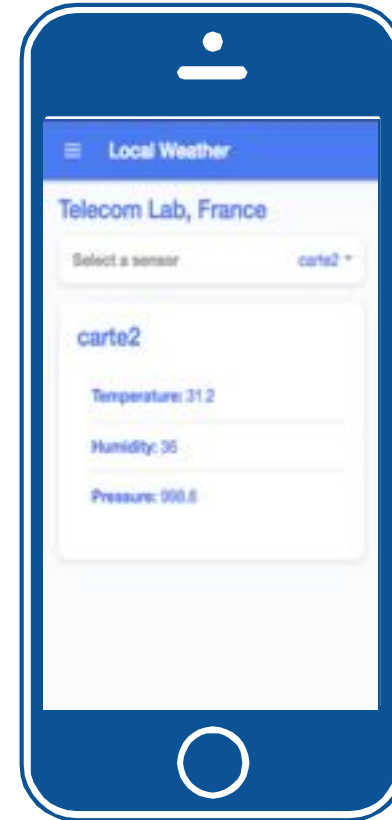
Website



Web Dashboard to retrieve the informations

6. Services

Mobile application



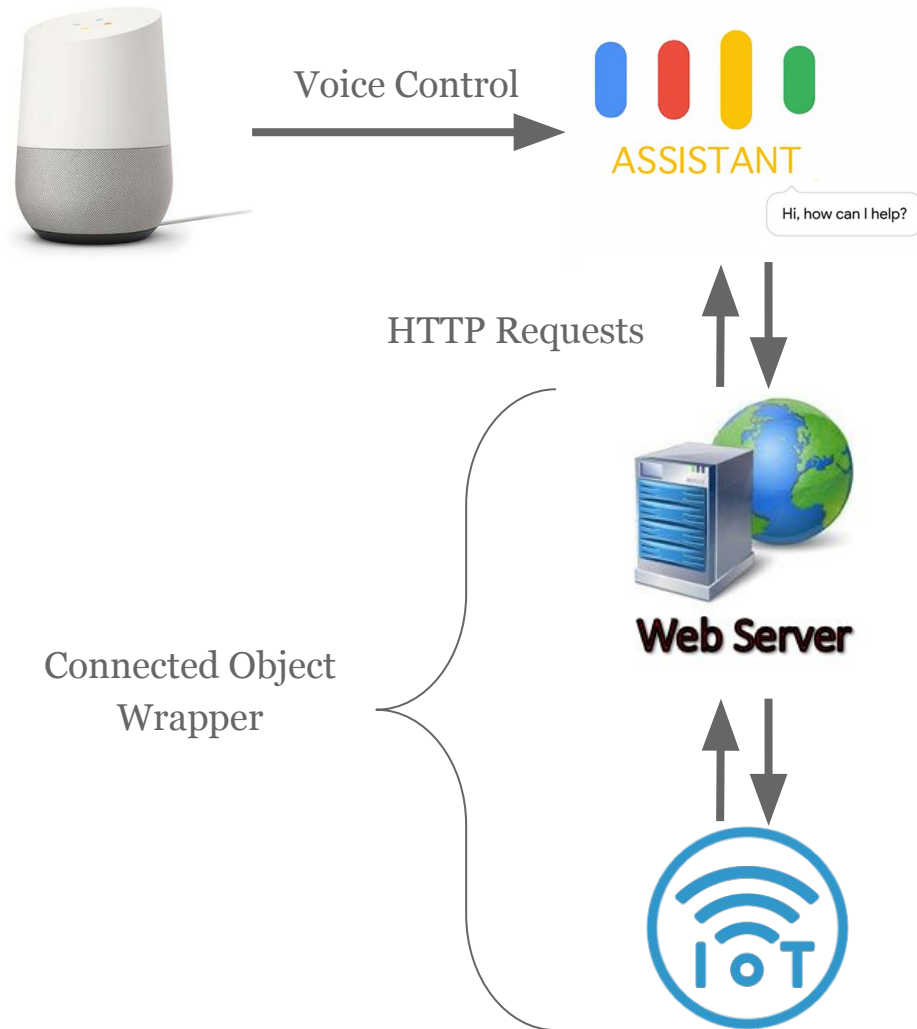
Web Application to retrieve the informations

6. Services



**Speech recognition for
interacting with connected
objects**

Conclusion



Conclusion



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1.

TRANSITION HEADLINE

*Let's start with the
first set of slides*

“

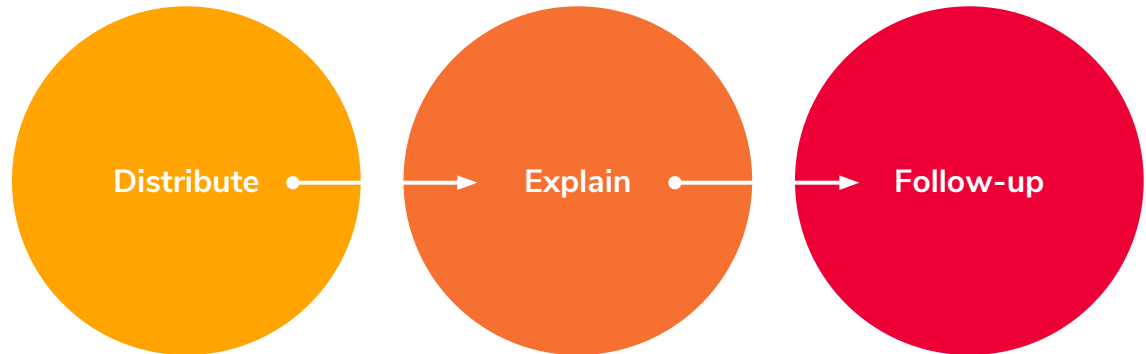
*Quotations are commonly printed as a means of **inspiration** and to invoke philosophical thoughts from the reader.*

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- Distribute before a meeting when the topic is highly complex or technical
- To fully explain your idea before booking a meeting with someone
- As a reference and follow-up material





BIG CONCEPT

Bring the attention of your audience over a key concept using icons or illustrations

In two or three columns



Yellow

Is the color of gold, butter and ripe lemons. In the spectrum of visible light, yellow is found between green and orange.

According to surveys in Europe, Canada, and the United States, yellow is the color people most often associate with amusement, gentleness, and spontaneity, but also with duplicity, envy, jealousy, avarice, and, in the U.S., with cowardice.

It plays an important role in Asian culture, particularly in China, where it is seen as the color of happiness, glory, wisdom, harmony, and culture.



Blue

Is the colour of the clear sky and the deep sea. It is located between violet and green on the optical spectrum.

Surveys in the US and Europe show that blue is the colour most commonly associated with harmony, faithfulness, confidence, distance, infinity, the imagination, cold, and sometimes with sadness.

In US and European public opinion polls it is the most popular colour, chosen by almost half of both men and women as their favourite colour.



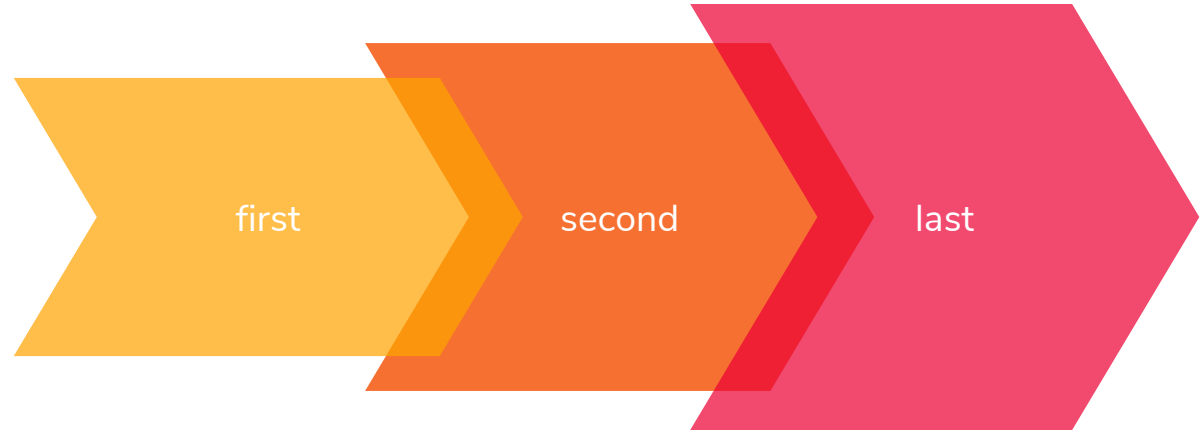
Red

Is the color of blood, and because of this it has historically been associated with sacrifice, danger and courage.

Modern surveys in the United States and Europe show red is also the color most commonly associated with heat, activity, passion, sexuality, anger, love and joy. Red is also a color widely used for getting attention, such as stop signs or royal dresses.

In China, India and many other Asian countries it is the color of symbolizing happiness and good fortune.

Our process
is easy



Let's review some concepts



Yellow

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Blue

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Red

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Yellow

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Blue

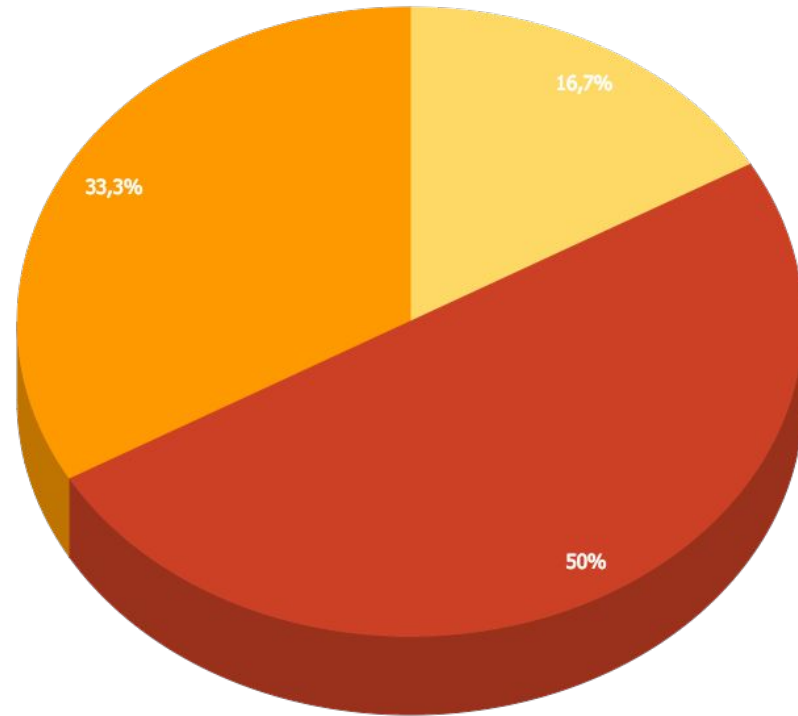
Is the colour of the clear sky and the deep sea. It is located between violet and green on the optical spectrum.



Red

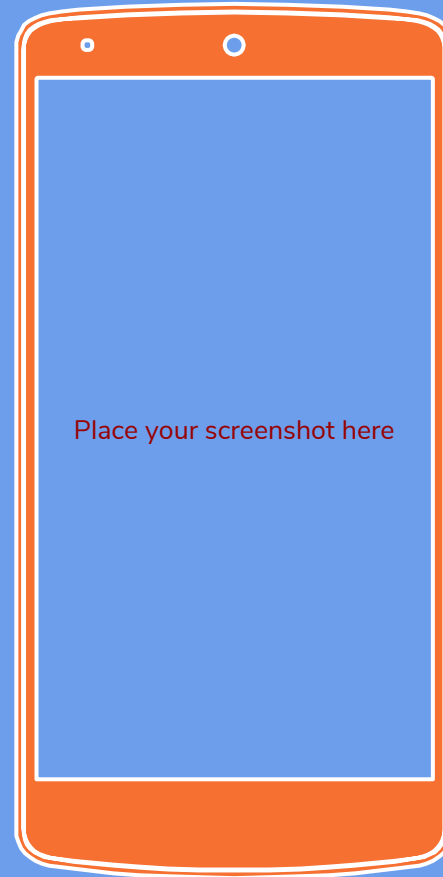
Is the color of blood, and because of this it has historically been associated with sacrifice, danger and courage.

You can
insert graphs
from Google
Sheets



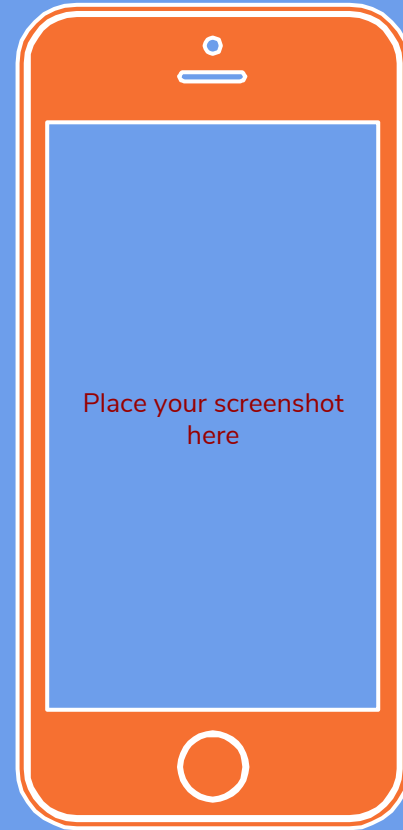
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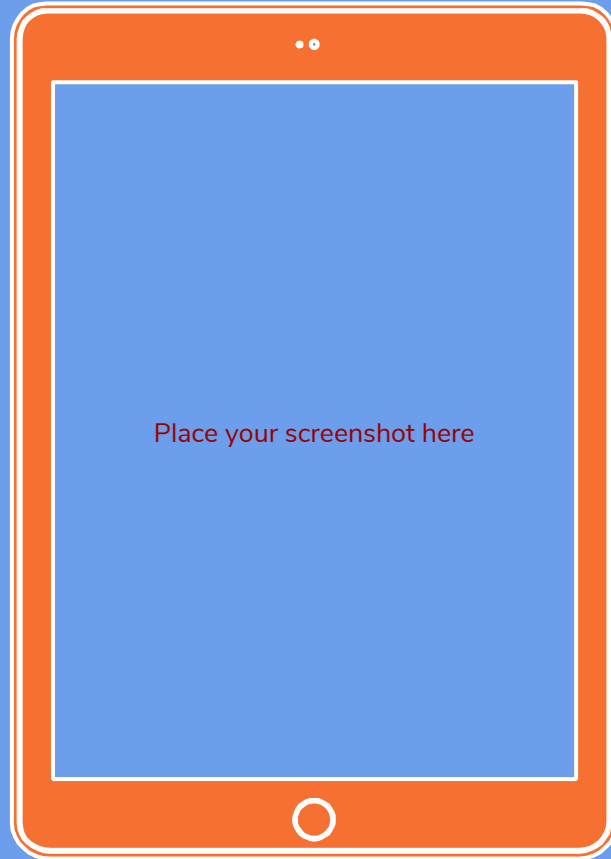
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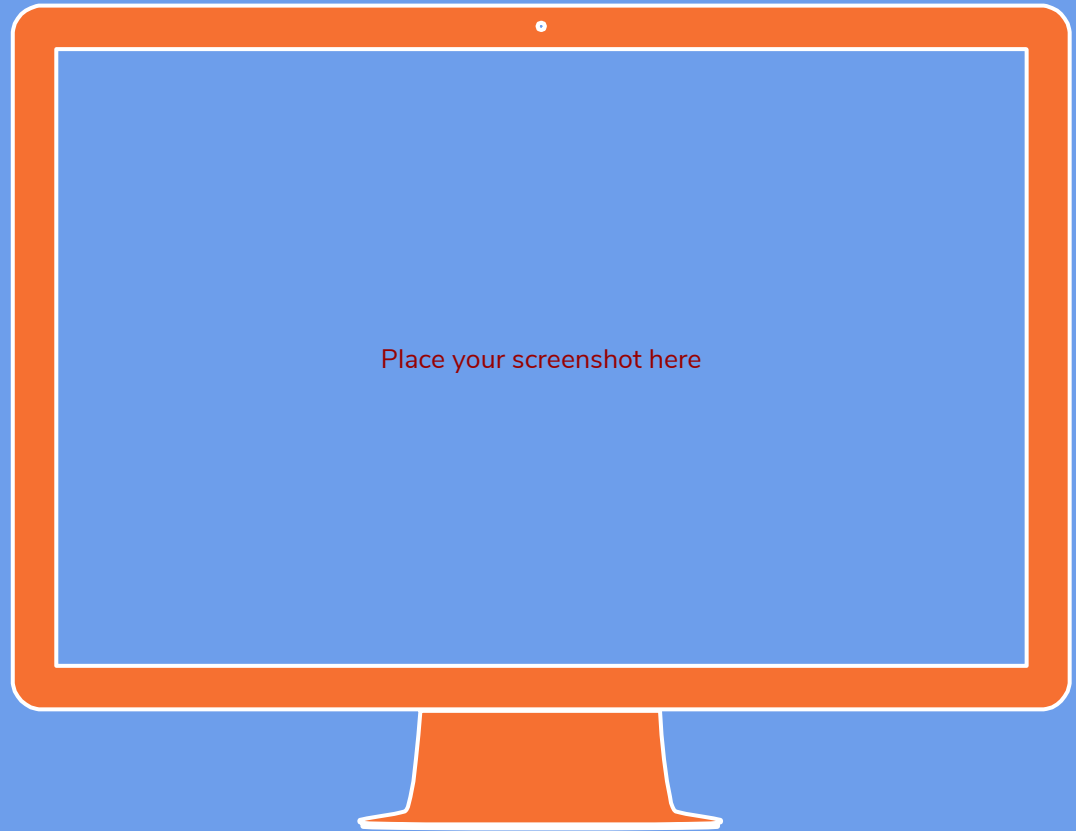
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- Orange **#f67031**
- Yellow **#ffa400**
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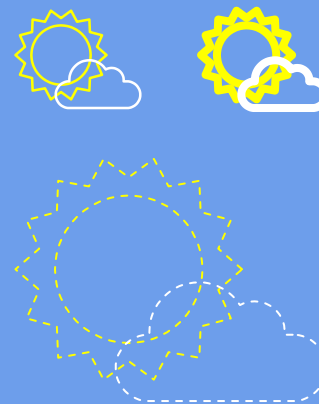
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