

# Digital Logic Design (EC 212)

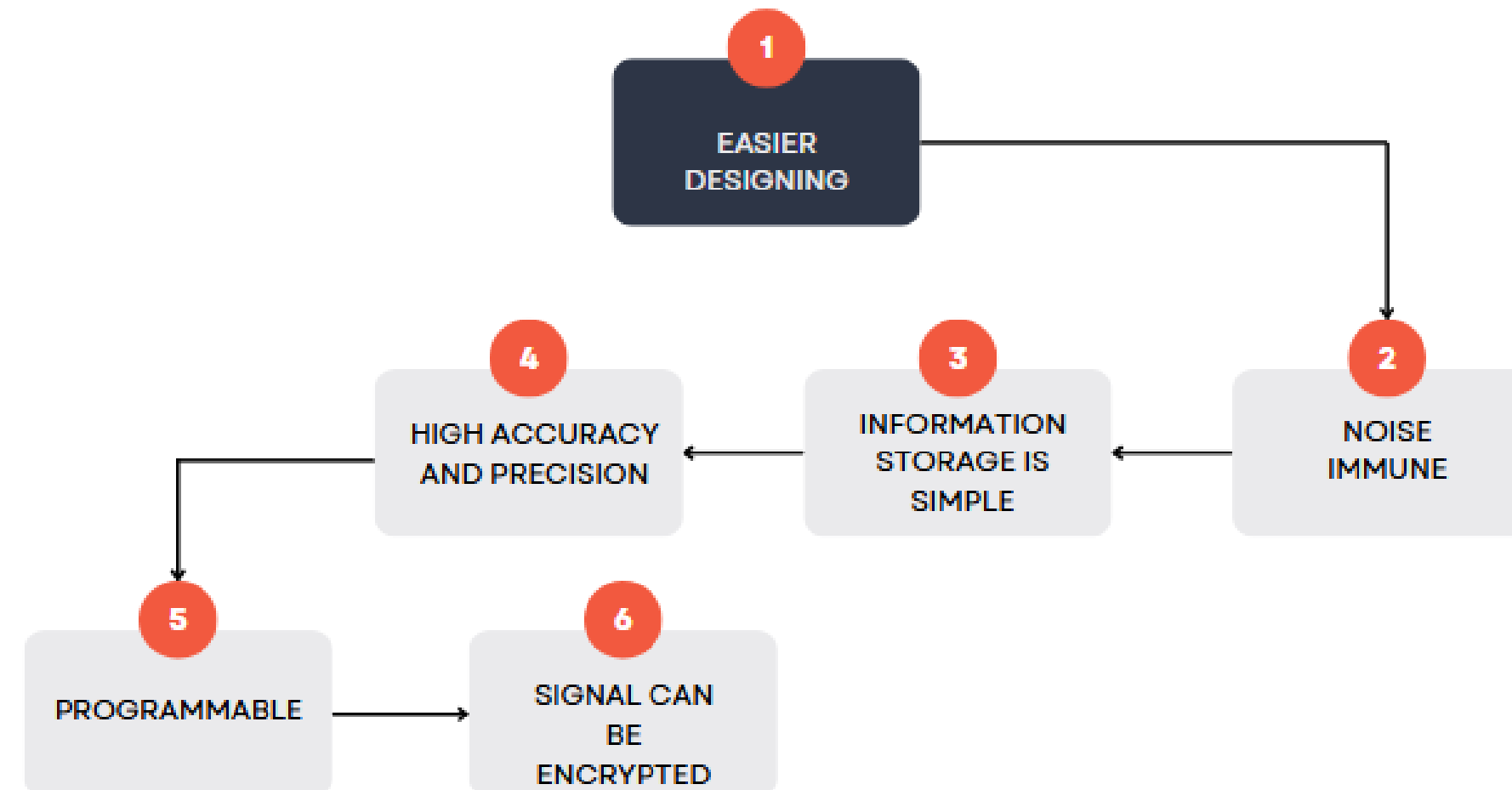


# Digital Signals

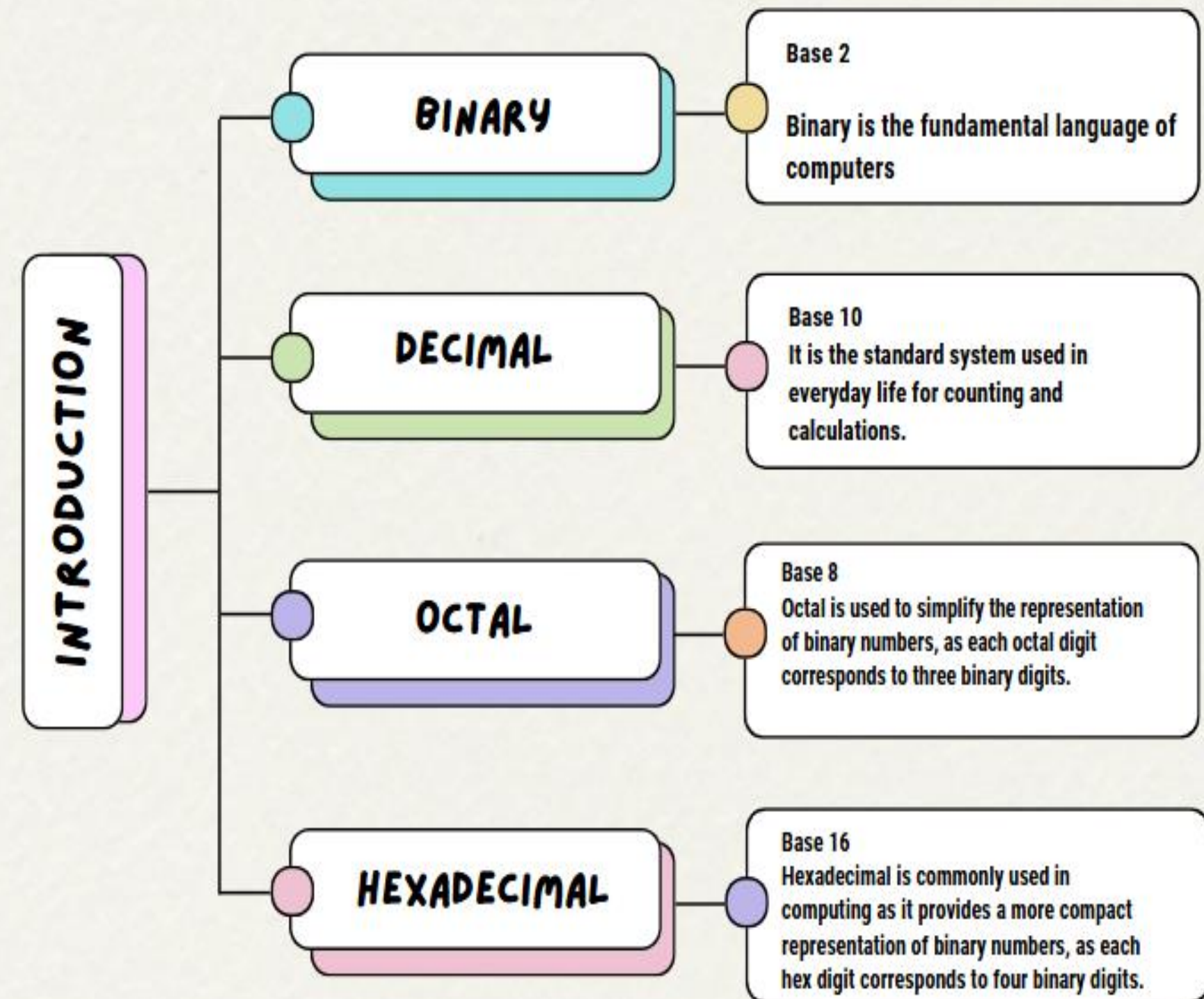
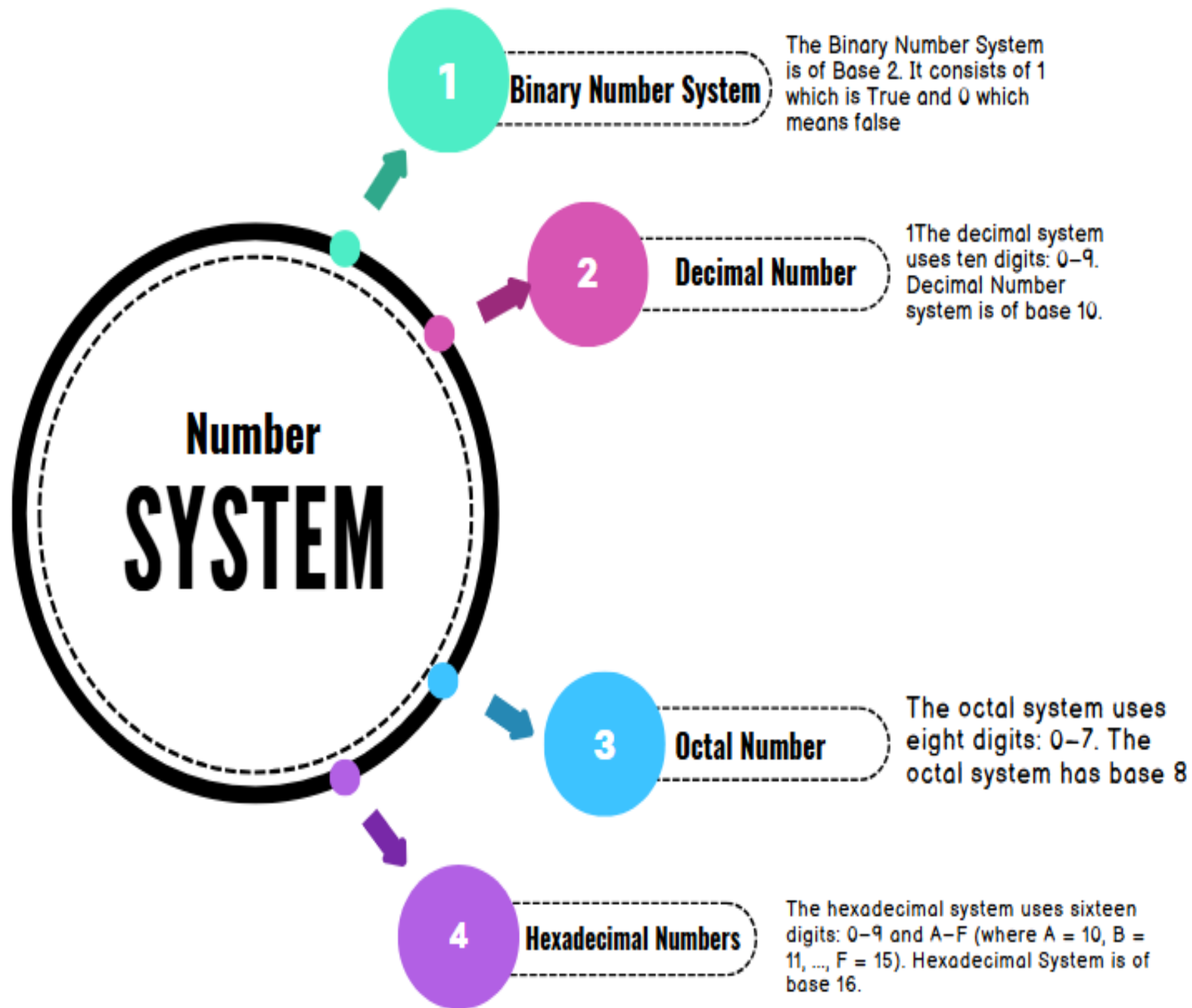


**Digital Signals:** A digital signal is a signal that is used to represent data as a sequence of separate values at any point in time

## Advantages of Digital Signals



# Number Systems and Boolean Algebra





# Binary Number System



## BINARY NUMBER SYSTEM

The binary number system uses only two digits: 0 and 1. Binary Number System have base 2.

## BINARY TO DECIMAL

To Convert Binary to Decimal we multiply each digit by 2 raised to the power of it's position in the number.

COMPUTER SYSTEMS USE BINARY TO PERFORM ALL OPERATIONS.

## BINARY NUMBER SYSTEM

IT IS ESSENTIAL IN DATA STORAGE, PROGRAMMING, AND DIGITAL CIRCUIT DESIGN.

## EXAMPLE

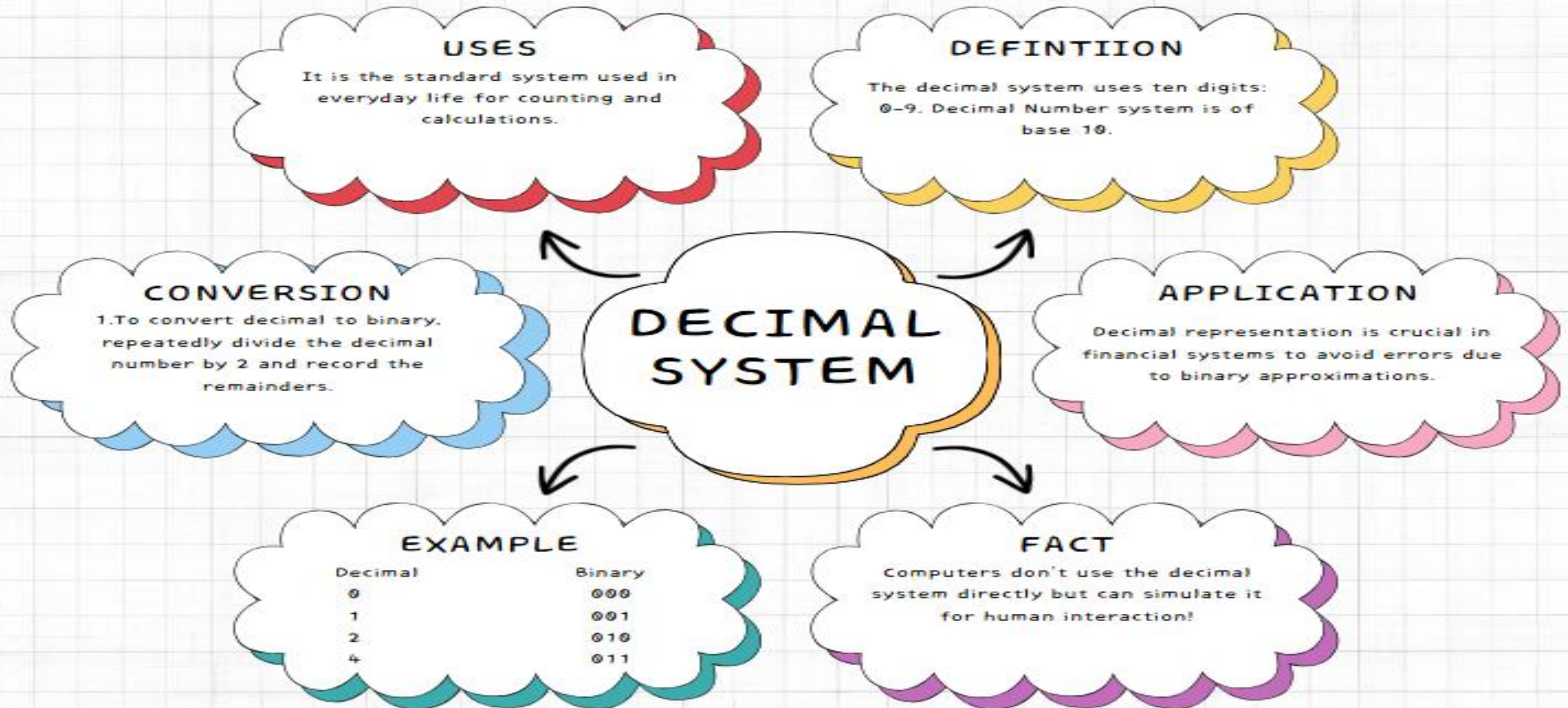
Binary: 1010  
Decimal =  $(1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) = 10$  (decimal)

## CRAZY FACT

All digital data—movies, music, photos, apps, even the internet itself—is just a massive sequence of 0s and 1s!



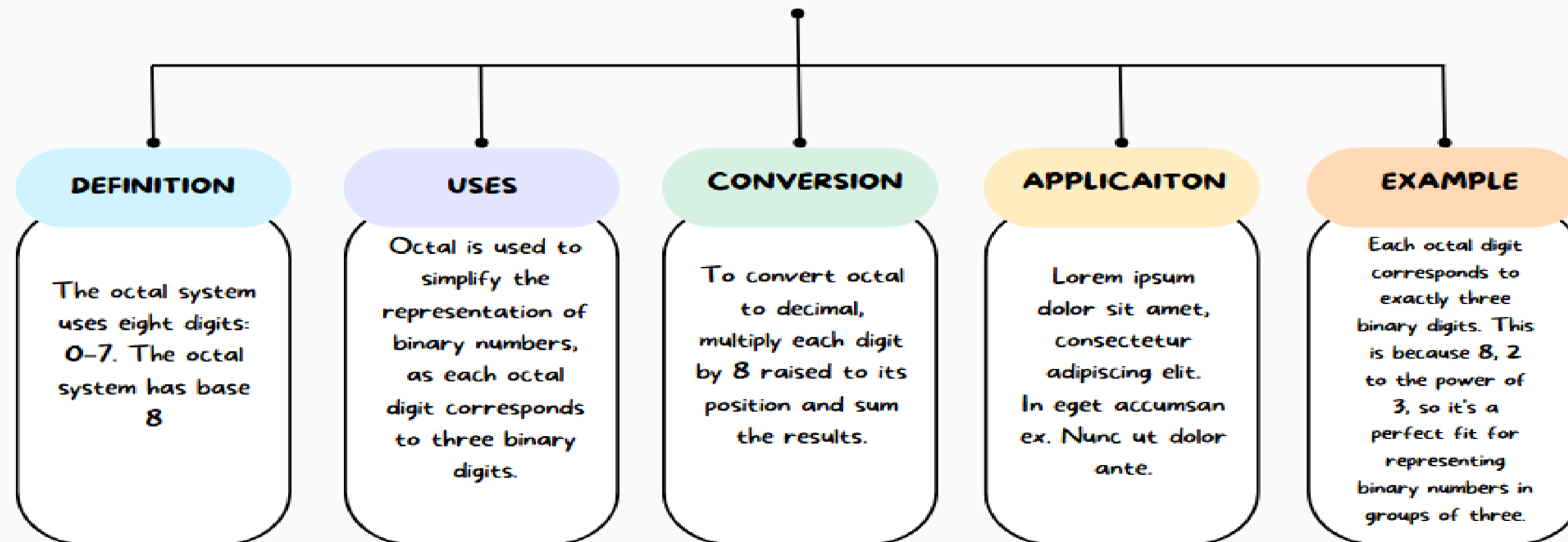
# Decimal Number System



# Octal Number System



## Octal Number System



# Hexadecimal Number System



## REVERSE

Each time divide decimal by 16 and note its remainder

## RANGE

1-9  
A-F = 10-16

## CONVERSION

multiply each digit by 16 raised to its position and sum the results.

# HEXADECIMAL

## DEFINITION

The hexadecimal system uses sixteen digits: 0-9 and A-F

## BASE

Hexadecimal consists of a base - 16

## EXAMPLE

Hexadecimal: A3  
Decimal Conversion:  
 $(10 \times 16^1) + (3 \times 16^0)$   
= 163 (Decimal)

# Applications of Number Systems



## Applications

B

### Binary Number System

1. Foundation of all digital systems.
2. Used in computer programming, data processing, and storage.

D

### Decimal Number System

1. Everyday calculations and measurements.
2. Used in computer programming, data processing, and storage.

O

### Octal Number System

1. Simplifies binary representation in digital systems.
2. Used in UNIX file permissions.

H

### Hexadecimal Number System

1. Compact representation of binary.
2. Used in memory addressing, color codes in web development, and debugging.



Thanks