# 02-Dates Guideline

INT221 Integrated Project 2022

# Prelude

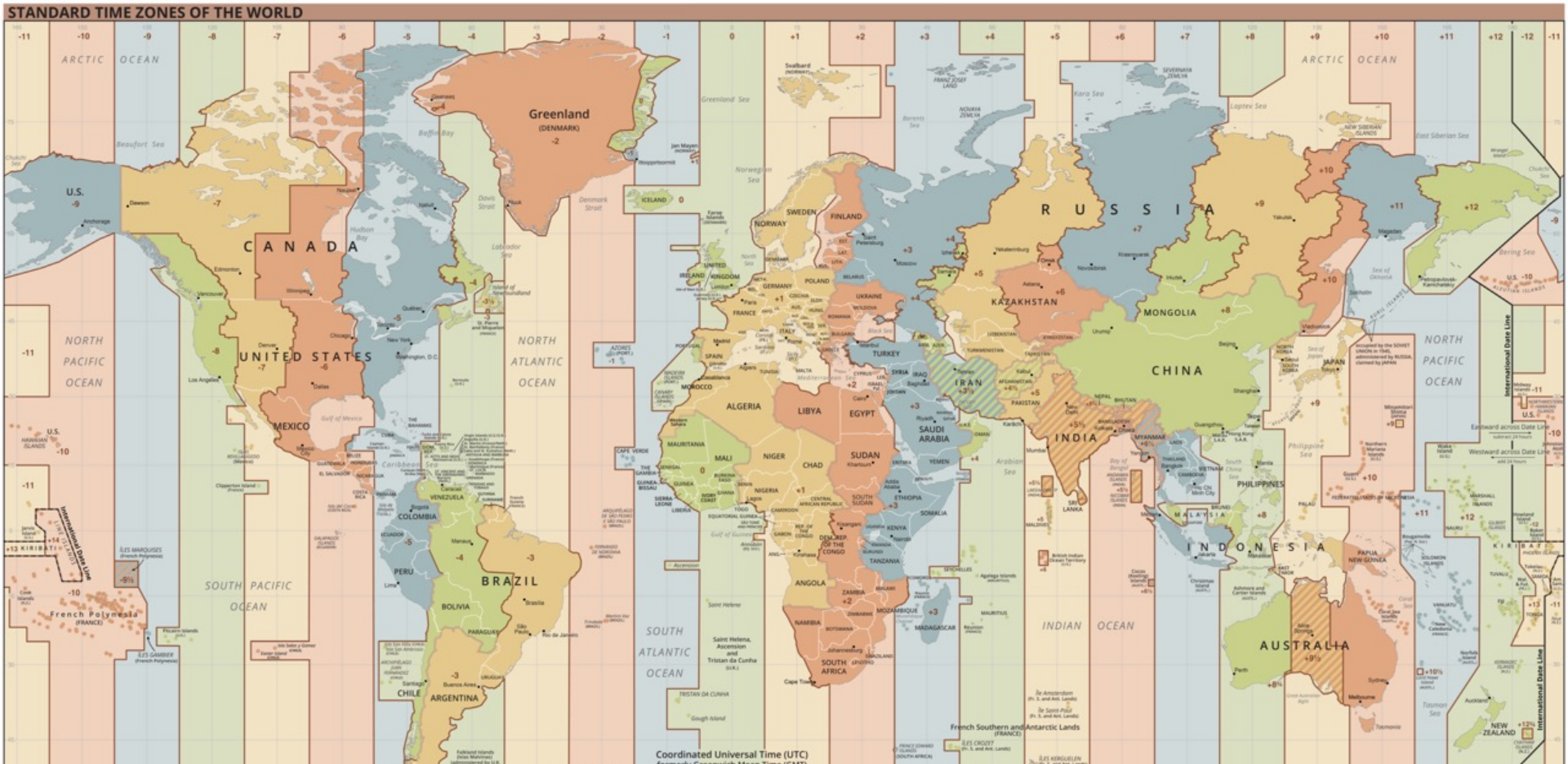
- Date and Time are one of the important data types
- Need to understand how it is stored on computer and how it is represented
- Need to know how to transmit/specify date/time between frontend/backend/database

Fetch date from API

{ "humanReadable": "Tue Apr 25 08:07:39 ICT 2023", "timeStamp": "1682384859780" }

# Timezone

UTC Coordinated Universal Time
GMT Greenwich Mean Time
ICT IndoChina Time



# MySQL

- https://dev.mysql.com/doc/refman/8.0/en/date-and-time-types.html
- DATETIME
  - MySQL retrieves and displays DATETIME values in 'YYYY-MM-DD hh:mm:ss' format.
  - The supported range is '1000-01-01 00:00:00' to '9999-12-31 23:59:59’
  - When insert DATETIME field, we can specify timezone, e.g., ‘2023-03-23 13:30:00+07:00'
- TIMESTAMP
  - TIMESTAMP has a range of '1970-01-01 00:00:01' UTC to '2038-01-19 03:14:07' UTC
  - MySQL converts TIMESTAMP values from the current time zone to UTC for storage, and back from UTC to the current time zone for retrieval.

# Java

- https://docs.oracle.com/javase/tutorial/datetime/iso/index.html
- Standard Calendar is the core of the Date-Time API in the java.time package. The classes defined in java.time base their calendar system on the ISO calendar.
- Date-Time with timezone:
  - ZonedDateTime : combines the LocalDateTime class with the ZoneId class
    - supports DST(Daylight Saving Time) and uses System's timezone as default.
  - Instant class : represents the start of a nanosecond on the timeline. This class is useful for generating a time stamp to represent machine time.
    - toString() follows the ISO-8601 standard for representing date and time.

# Spring Boot : application.properties

- `spring.jpa.properties.hibernate.jdbc.time_zone=UTC`
  - specify that database stores date-time in UTC, not system's timezone
- `spring.jackson.time-zone=UTC`
  - specify that the JSON output on date-time must be in UTC, not system's timezone

# JavaScript

- https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Date#
- Date
  - Date objects encapsulate an integral number that represents milliseconds since the midnight at the beginning of January 1, 1970, UTC (the epoch).
  - A date is represented internally as a single number, the timestamp. When interacting with it, the timestamp needs to be interpreted as a structured date-and-time representation.
  - `toISOString()` returns a string in the format 1970-01-01T00:00:00.000Z
  - `toLocaleString()` uses locale-specific date and time formats

# Default Timezone

- JavaScript running on browser : System Timezone
- Java : System Timezone
- MySQL : System Timezone
- Docker Container : UTC
  - ENV TZ=Asia/Bangkok  # specify to use ICT in container