

Time Zones

How to handle them correctly less wrong

Tuấn-Anh Nguyễn

Time Zones

- Locality aspect of time tracking.
- Offsets don't need to be whole numbers of hours.

- A 20th-century "invention".
- Not much of a problem for tropical countries.
- Not always 1 hour.
- Gaps and folds (duplicates).
- Spring forward, fall back.

Abbreviated Time Zones

- UTC, ICT, SGT/SST, CET, CST.
- Can observe DST by changing offsets.
- Ambiguous.
- **Not a standard.**
- Ok for display.
 - Locale-specific, btw.
- Source of headaches for input data.
- Not a good idea to expose via our programmatic interfaces (APIs, webhooks, Kafka)

IANA Time Zones

- Is a standard.
- City/country/area level. (And more...)
- Can observe DST by switching associated regional tz.
- Periodically-updated DB: the tz database.

Postgres - Aware vs. Naive

- Of the client's preference.
- Storage is the same. **Input time zone is not stored.**

```
CREATE TABLE test(  
  created_at timestamp with time zone  
);
```

```
INSERT INTO test VALUES('2023-11-15 11:00:00+01'::timestampz);
```

```
SELECT * FROM test;
```

```
SELECT current_setting('timezone');
```

- time with time zone is a bad idea, but supported for standard compliance.

Postgres - tz database

- Uses system's.

Python - Aware vs. Naive

- `datetime.tzinfo`.

Python - pytz vs. zoneinfo

- `datetime.replace()` before PEP-495 was kind of an undefined behavior.
- `pytz`
 - `pytz.timezone().localize()` vs. `datetime.replace() + pytz.timezone().normalize()`.
 - Arithmetic need to be accompanied by `.normalize()`.
- `zoneinfo`:
 - It just works.
 - Arithmetic works with wall time.
 - `datetime.fold`

Python - tz database: pytz vs. tzdata

- Falls back to system's.
- `zoneinfo.TZPATH`

Python - Migration

- Check that libraries/framework have already migrated.
- Replace `pytz` with `tzdata` in dependencies.
- Search and replace `pytz` uses with `zoneinfo` and `tzdata`.

JVM - Aware vs. Naive

- `ZonedDateTime` vs. `LocalDateTime`

JVM - tz database

- Used to be bundled.
- TZ Updater.

JVM - Migration

- The type system will guide you. `java.time` is pretty good.
- Just remove Joda and fix compilation errors.