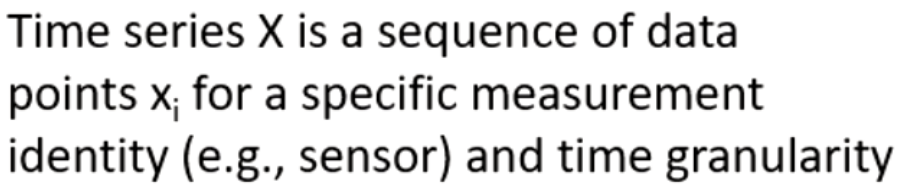
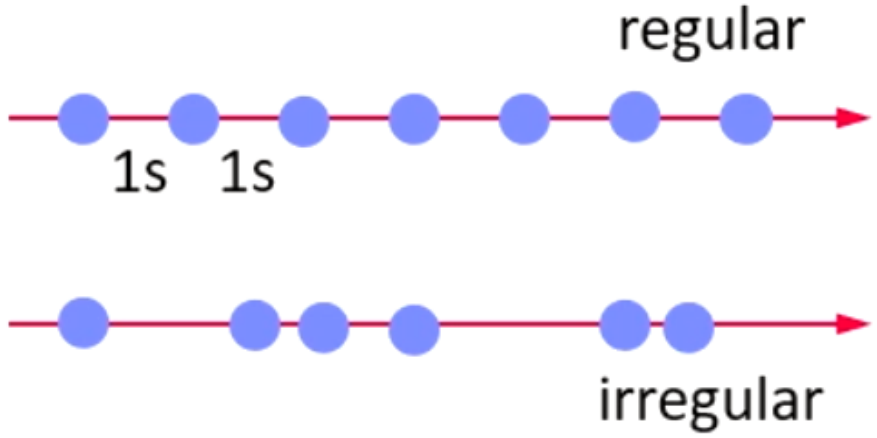
Overview

- time series is sequence of data entries
  - usually in periodic intervals
  - e.g. data every second
  - 

- time intervals
  - regular - periodic/equidistant
  - irregular - aperiodic
  - 

- allow dedicated storage and analysis techniques
- used in following domains
  - IoT
  - sensor networks
  - smart production/telemetry
  - stock trading
  - server/application metrics
  - event/log streams
- applications
  - monitoring
  - anomaly detection
  - time series forecasting

InfluxDB Example

Compression (of blocks)

- **Compress up to 1000 values per block** (Type | Len | Timestamps | Values)
- **Timestamps:** Delta + Run-length encoding for regular time series; Simple8B or uncompressed for irregular
- **Values:** double delta for FP64, bits for Bool, double delta + zig zag for INT64, Snappy for strings

Query Processing

- SQL-like and functional APIs for filtering (e.g., range) and aggregation
- Inverted indexes

```
SELECT percentile(90, user)
  FROM cpu WHERE time>now()-12h
  AND "region"='west'
  GROUP BY time(10m), host
```

Measurement to fields:

cpu → [user,sys,idle]
host → [A, B]
Region → [west, east]

Posting lists:

cpu → [1,2,3,4,5,6]
host=A → [1,2,3]
host=B → [4,5,6]
region=west → [1,2,3]

[[Data Models]]