

# Historical Database for DynaMIT2.0

Meng Yue

Department of Automation, Tsinghua University, China

SMART FM-IRG, August 8, 2016



# Outline

1. DynaMIT2.0 Database

2. Experiment



# Outline

## 1. DynaMIT2.0 Database

## 2. Experiment

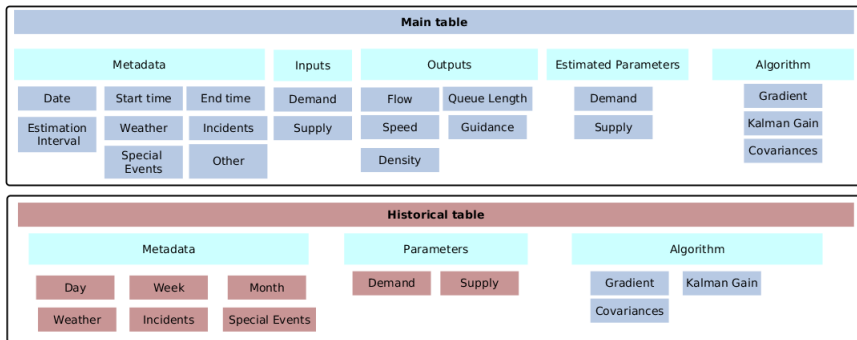


# Overview

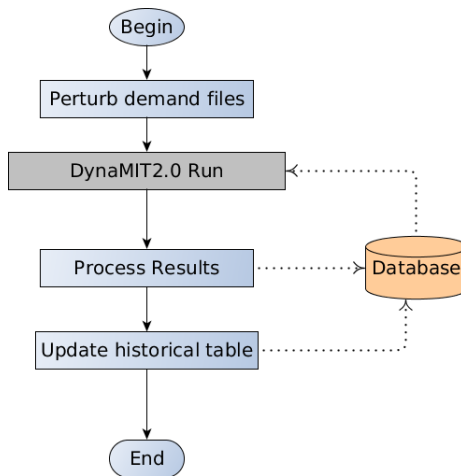
- ▶ Archive inputs and outputs for each day
- ▶ Save selected inputs and output files from each run to database
- ▶ Update historical database each day
- ▶ Auto-check and backup
- ▶ Online Calibration



# Database Structure



# Testing



# Implementation

- ▶ Database: PostgreSQL
- ▶ Language:
  - ▶ Python (file operation)
  - ▶ Java (database I/D/U/Q)
  - ▶ Shell (whole process)



# Setup process

- ▶ CREATE TABLE: database.config
- ▶ Framework parameter: params.config & init.sh

```
//Metadata(Tags)
```

Column= "isHoliday"	Type = "boolean"
Column= "season"	Type = "varchar(1000)"
Column= "weather"	Type = "varchar(1000)"
Column= "temperature"	Type = "real"
Column= "humidity"	Type = "real"
Column= "rainfall"	Type = "real"
Column= "wind"	Type = "real"
Column= "incidents"	Type = "varchar(10000)"
Column= "specialEvent"	Type = "varchar(10000)"
Column= "description"	Type = "varchar(10000)"

Edit Data - myServer (localhost:5432) - dyna - public.main

No limit

	isholiday boolean	season character	weather character	temperature real	humidity real	rainfall real
1						
2						
3						
4						
5						
6						
7						
8						





# Insert process(main table)

- ▶ dtaparam.dat
- ▶ behavior.dat
- ▶ supplyparam.dat
- ▶ sensor.out
- ▶ demand.dat
- ▶ estimatedOD\*
- ▶ EOD.txt
- ▶ sen\_flw\_\*
- ▶ sen\_spd\_\*
- ▶ ...



# Update process(historical table)

- ▶ Last estimated OD-flow
- ▶ Simple moving average
- ▶ Exponential moving average
- ▶ Smoothing Model



# Screen-shot

```
dynamit@DynaMIT-WS:~/student/mengyue/drill/test$ . 2_simulationToDatabase.sh
```

```
=====OcSimu2Db_Platform=====
=====MENG YUE==August 3,2016=
```

```
LOOP8|=>SIMUDATE: 2016/01/08
```

```
Check date: 2016/01/08
Connecting to database...
Database connected.
Searching date 2016/01/08
```

```
Update process: HOD for 2016/01/08
```

```
Clear backup...
```

```
=== mv output/temp files after run of DynaMIT in current directory to destination ==
```

```
Run DynaMIT&MITSIM...
```

```
**** DynaMIT Real-time and Closed-Loop version 2.1.0 ****
Based on DynaMIT Corba-free version
Build date: Feb 24 2016 19:53:35
```



**Insert to database...**

Connecting to database...

Database connected.

THU&gt;&gt;&gt;Load data path and database configuraion

THU&gt;&gt;&gt;Handling inserting CONFIG TABLE process~

THU&gt;&gt;&gt;Interval number = 4

THU&gt;&gt;&gt;Get IdList 7 1 1 1

THU&gt;&gt;&gt;Handling inserting MAIN TABLE process~

THU&gt;&gt;&gt;24648, 1690577, 9783, 33859, 9783, 48560

THU&gt;&gt;&gt;Insert main record 260

THU&gt;&gt;&gt;Finished inserting!

THU&gt;&gt;&gt;Check validity!

THU&gt;&gt;&gt;Validity Approved!

Database disconnected.

**Backup DynaMIT results...****Load from database and save to files...**

Connecting to database...

Database connected.

length=2

/home/dynamit/student/mengyue/drill/test/DBSAVE/DynaMIT\_FILE08/

2016/01/08

Database disconnected.

**Finished Loop08 !****LOOP2|=>SIMUDATE: 2016/08/11**

Connecting to database...

Database connected.

Searching date 2016/08/11

**[ERROR]:The date is already exist, abort this simulation and go next loop**

# Outline

1. DynaMIT2.0 Database

2. Experiment



# Update algorithm(1)

Fixed historical OD-flow (base):

$$x_h^{H,n} = x_h^{H,n-1} = \text{Const}$$

Last estimated OD-flow:

$$x_h^{H,n} = \hat{x}_h^n$$

Notation:

- ▶  $x_h^{H,n} \sim$  Historical OD-flow at interval  $h$  after  $n$  days
- ▶  $\hat{x}_h^n \sim$  Estimated OD-flow at interval  $h$  on the  $n^{\text{th}}$  day



# Update algorithm(2):Moving Average

Simple moving average:

$$x_h^{H,n} = \frac{1}{M} \left( \sum_{k=0}^{M-1} \hat{x}_h^{n-k} \right)$$

Exponential moving average:

$$x_h^{H,n} = \alpha \cdot \hat{x}_h^n + (1 - \alpha)x_h^{H,n-1}$$

Notation:

- ▶  $x_h^{H,n} \sim$  Historical OD-flow at interval  $h$  after  $n$  days
- ▶  $\hat{x}_h^n \sim$  Estimated OD-flow at interval  $h$  on the  $n^{th}$  day
- ▶  $M \sim$  Window size
- ▶  $\alpha \sim$  Degree of weighting decrease between zero and one



# Update algorithm(3):Smoothing Model<sup>1</sup>

Smoothing model formula:

$$x_h^{H,n} = x_h^{H,n-1} + \alpha(\hat{x}_h^n - x_h^{H,n-1})$$

Notation:

- ▶  $x_h^{H,n} \sim$  Historical OD-flow at interval h after n days
- ▶  $\hat{x}_h^n \sim$  Estimated OD-flow at interval h on the  $n^{th}$  day
- ▶  $\alpha \sim$  A scalar between zero and one

---

<sup>1</sup>Kalidas, A. (1996) Estimation and Prediction of Time-Dependent Origin-Destination Flows



# Questions



# Thank you!

