Dashboard for Monitoring and Signaling Elder's Heart Disease

Outline


01
Before Considering Specification Design
02
Specification design
03
Structural design
04
Schedule and role assignment

01

Before Considering Specification Design

Review Requirement

Stakeholders

- Hospital, Organizations, and Families

Users

- Doctors , Organizations , Elders, and Families

Your goal

- To identify elder's heart disease before it happen

The input to your system

- Behavior data, sensor data and medical inspection result

The output of your system

- Dashboard and Signal

Technologies do you need to achieve your goal

- Big data and Machine learning

Question?

Do you have enough data for that purpose ?

Enough for demo, but not enough for implementing in real system.

Do there exist missing values ?

Yes, there are a lot of missing values. (Solution in slide 13)

Do their exist outliers ?

There are some outliers, but we won't remove it. (Reason in slide 14)

Recap from Conceptual design

Teacher's Suggestion

- Is the topic **too wide** ?
- Can be used dashboard every people ?

Risk

1. Smoking
2. High blood pressure
3. High blood cholesterol
4. Diabetes
5. Physical inactivity
6. Overweight
7. A family history of chest pain, heart disease or stroke

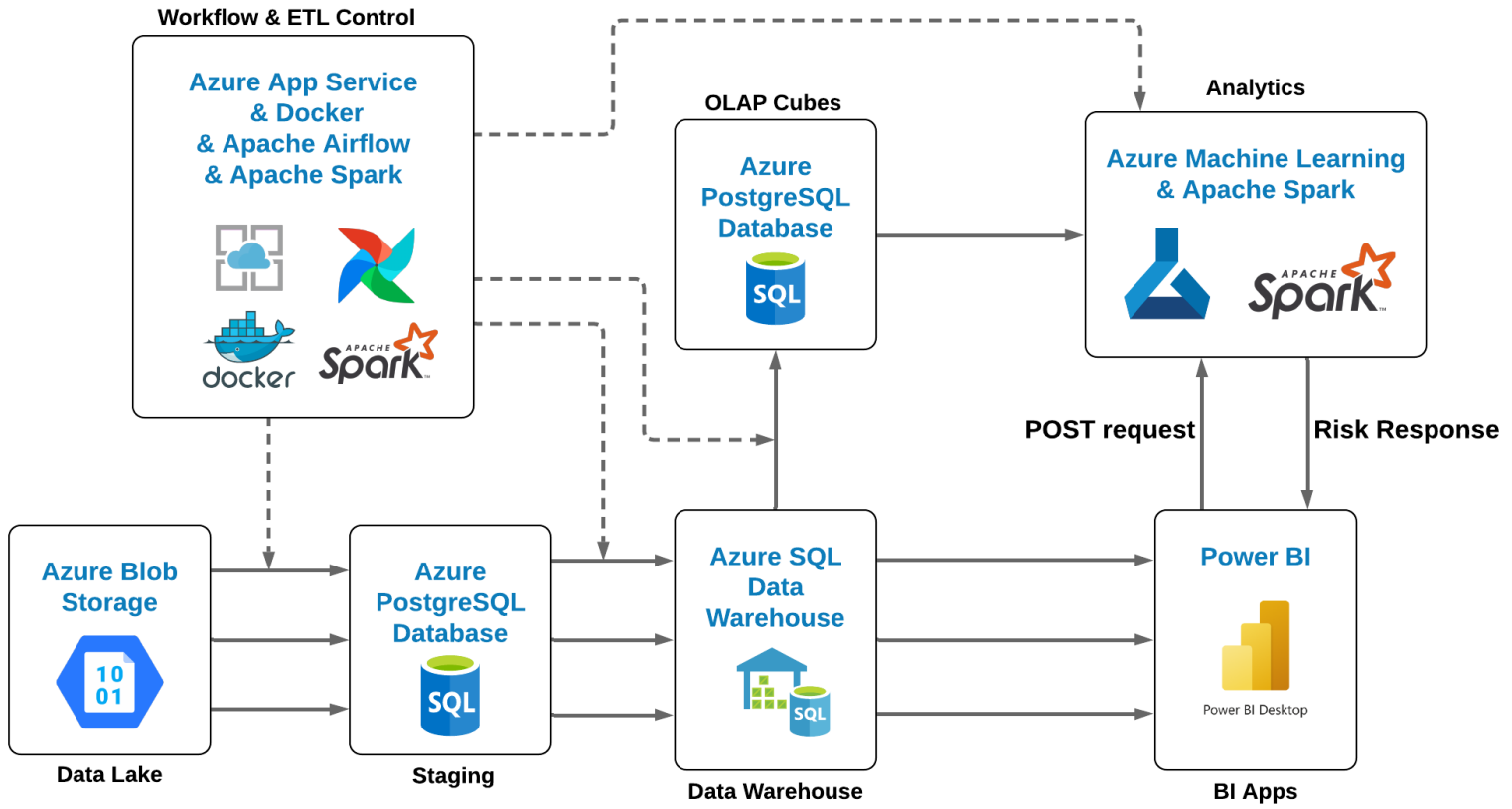
Resolve

- We choose **Acute Coronary Syndrome-ACS**.
- This Dashboard can be used every people.

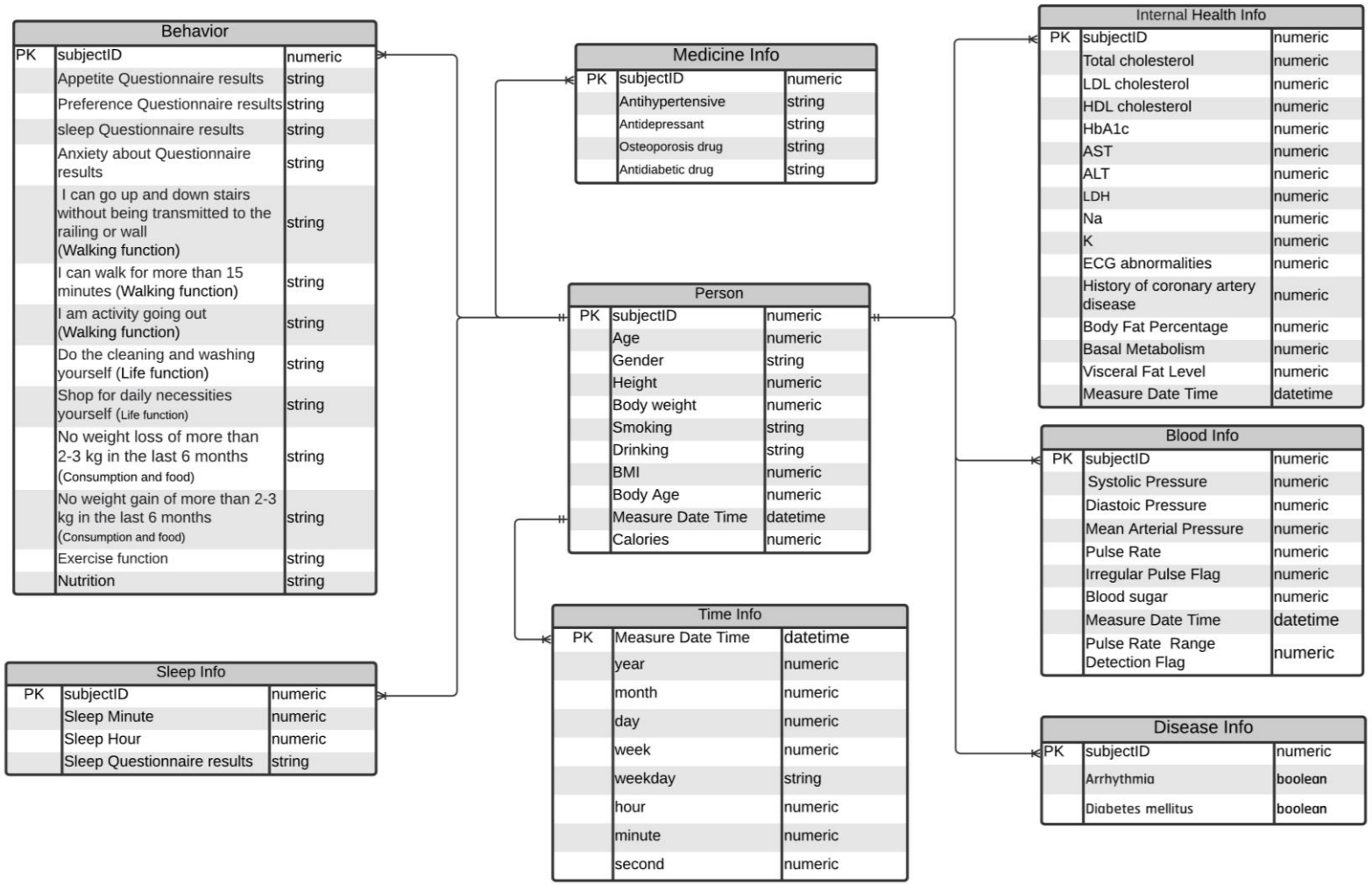
02 Specification design

https://github.com/Natchariyawong25/PBL_project

Data Pipeline



Data Model


Behavior
PK subjectID numeric
Appetite Questionnaire results string
Preference Questionnaire results string
sleep Questionnaire results string
Anxiety about Questionnaire results string
I can go up and down stairs without being transmitted to the railing or wall (Walking function) string
I can walk for more than 15 minutes (Walking function) string
I am activity going out (Walking function) string
Do the cleaning and washing yourself (Life function) string
Shop for daily necessities yourself (Life function) string
No weight loss of more than 2-3 kg in the last 6 months (Consumption and food) string
No weight gain of more than 2-3 kg in the last 6 months (Consumption and food) string
Exercise function string
Nutrition string
Medicine Info
PK subjectID numeric
Antihypertensive string
Antidepressant string
Osteoporosis drug string
Antidiabetic drug string
Person
PK subjectID numeric
Age numeric
Gender string
Height numeric
Body weight numeric
Smoking string
Drinking string
BMI numeric
Body Age numeric
Measure Date Time datetime
Calories numeric
Internal Health Info
PK subjectID numeric
Total cholesterol numeric
LDL cholesterol numeric
HDL cholesterol numeric
HbA1c numeric
AST numeric
ALT numeric
LDH numeric
Na numeric
K numeric
ECG abnormalities numeric
History of coronary artery disease numeric
Body Fat Percentage numeric
Basal Metabolism numeric
Visceral Fat Level numeric
Measure Date Time datetime
Blood Info
PK subjectID numeric
Systolic Pressure numeric
Diastoic Pressure numeric
Mean Arterial Pressure numeric
Pulse Rate numeric
Irregular Pulse Flag numeric
Blood sugar numeric
Measure Date Time datetime
Pulse Rate Range Detection Flag numeric
Disease Info
PK subjectID numeric
Arrhythmia boolean
Diabetes mellitus boolean
Sleep Info
PK subjectID numeric
Sleep Minute numeric
Sleep Hour numeric
Sleep Questionnaire results string
Time Info
PK Measure Date Time datetime
year numeric
month numeric
day numeric
week numeric
weekday string
hour numeric
minute numeric
second numeric

Visualization

Query design

Heart disease risk
(Gauge)

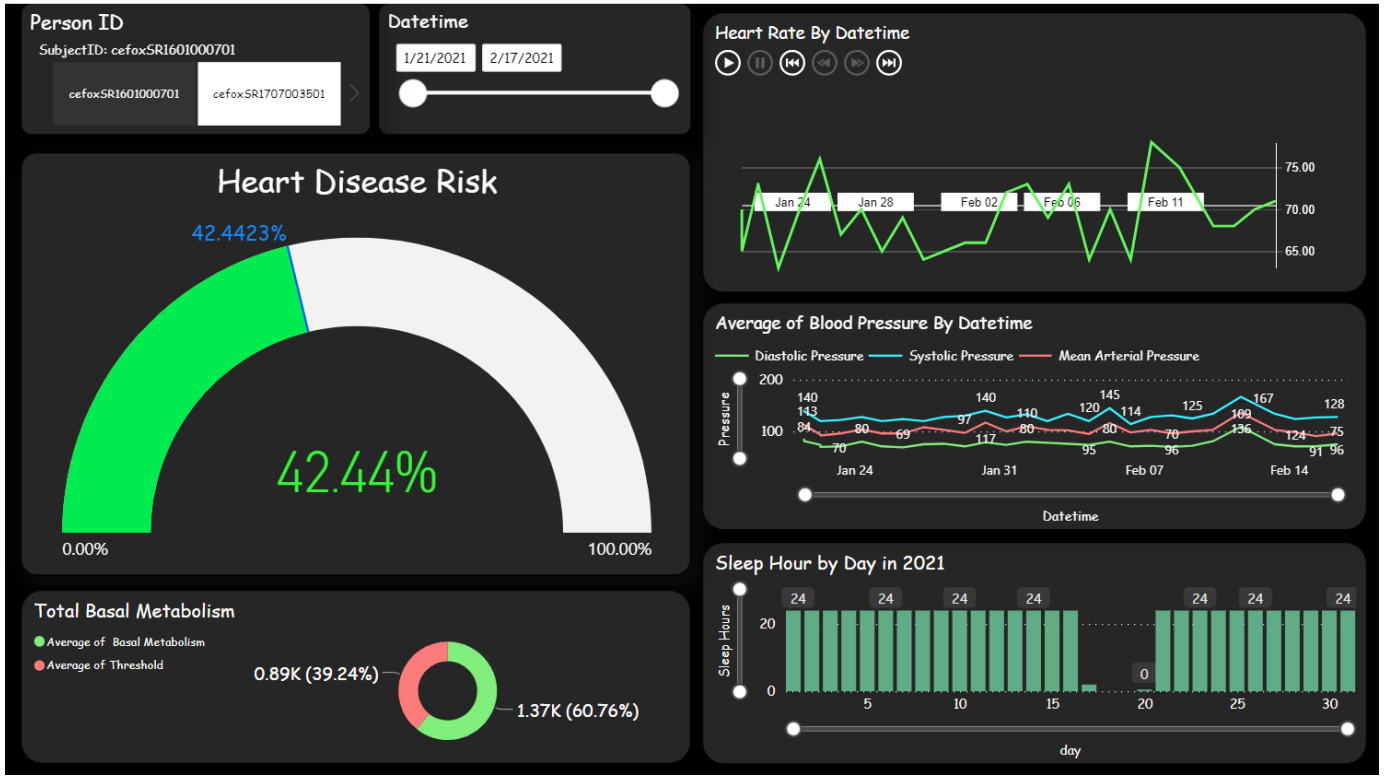
Heart rate & Time
(Line graph)

Average blood pressure & Time
(Line graph)

Total Basal Metabolism
(Threshold = BMI * 31)
(Donut)

Sleep time & Weekday
(Bar graph)

Dashboard design

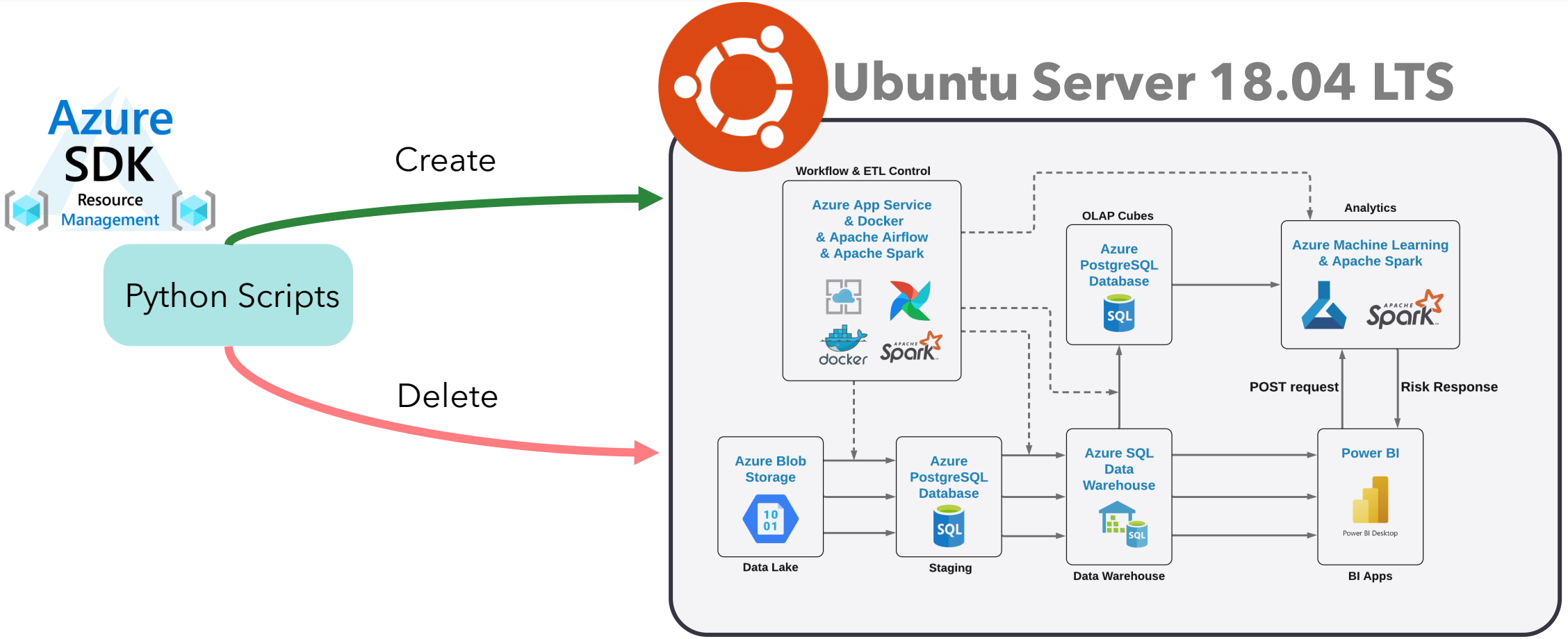


Dashboard Link

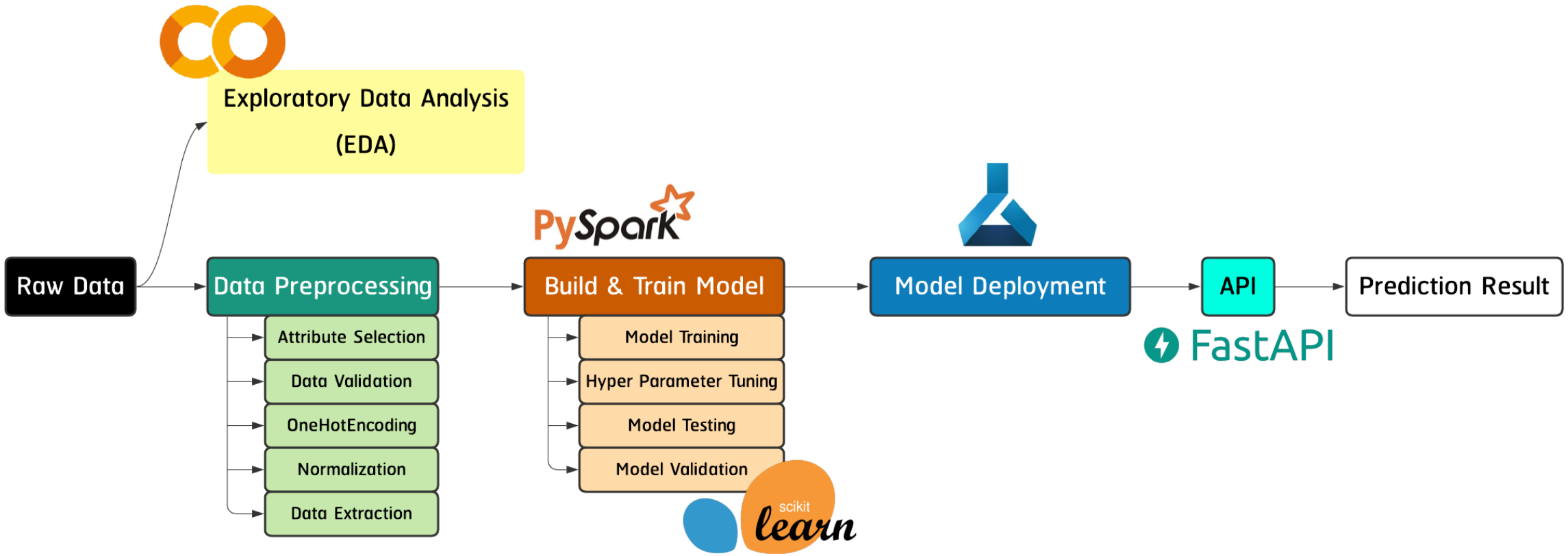
https://app.powerbi.com/view?r=eyJrIjoiNmJiYWU2YzctYmY3Yi00MjE4LTk0MjMtYWVmOGE0M2FmNDdmIiwidCI6IjZmNDQzMmRjLTIwZDItNDQxZC1iMWRiLWFjMzM4MGJhNjMzZCIsImMiOjEwfQ%3D%3D&embedImagePlaceholder=true&pageName=ReportSection

03 Structural design

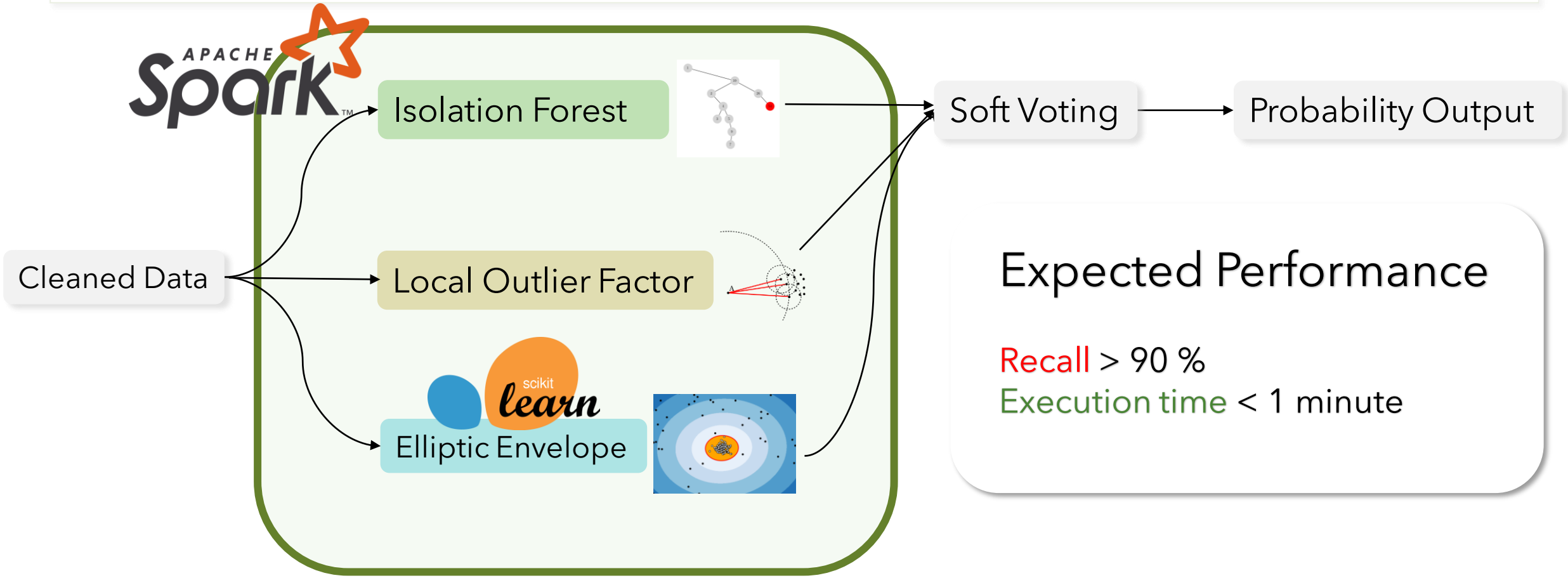
Infrastructure as Code (IaC)



Machine Learning Pipeline



Heart Disease Prediction through Anomaly Detection using Ensemble Machine Learning Model



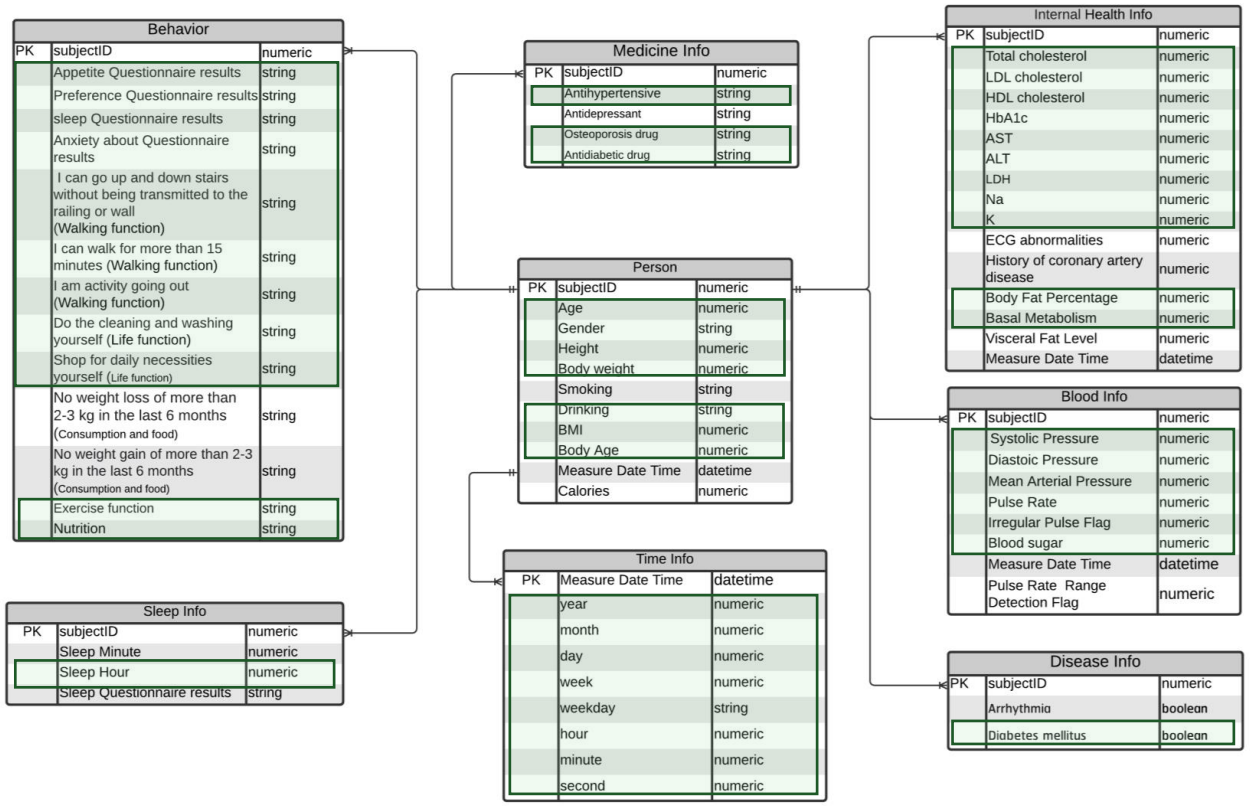
Expected Performance

Recall > 90 %

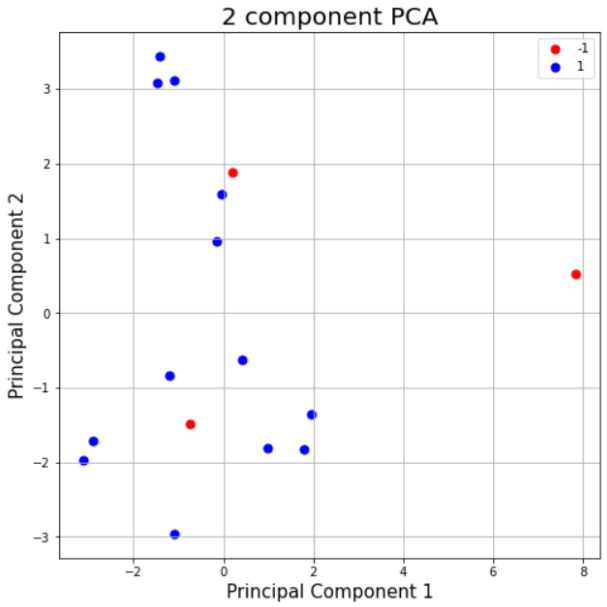
Execution time < 1 minute

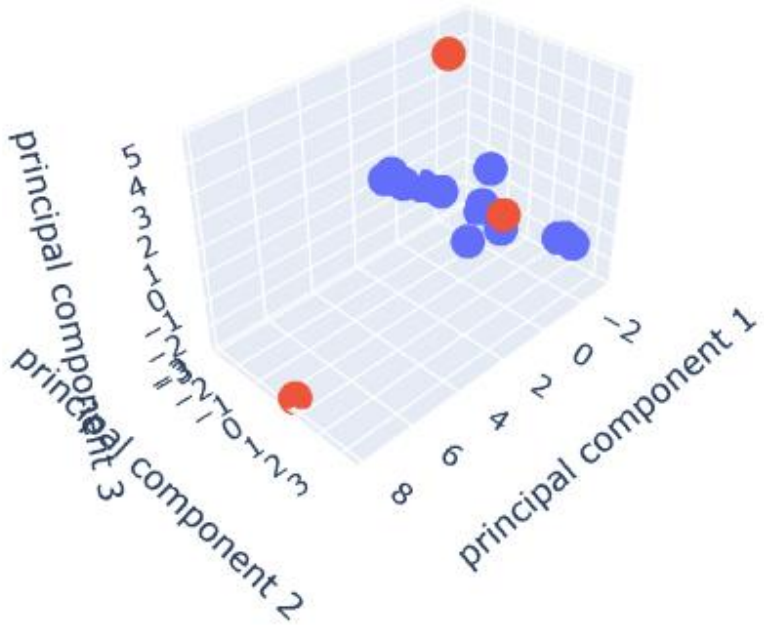
Input Features

- **42 Features**
- BMI, Body Age, Age, Gender, Height, Body weight, Drinking, Sleep Hour, Antihypertensive, Osteoporosis drug, Antidiabetic drug, Body Fat Percentage, Basal Metabolism, Total cholesterol, LDL cholesterol, HDL cholesterol, HbA1c, AST, ALT, LDH, Na, K, Diabetes mellitus, Systolic Pressure, Diastolic Pressure, Mean Arterial Pressure, Pulse Rate, Irregular Pulse Flag, Blood sugar, Appetite Questionnaire results, Preference Questionnaire results, Sleep Questionnaire results, Anxiety about health Questionnaire results, I can go up and down stairs without being transmitted to the railing or wall, I can walk for more than 15 minutes, I am actively going out, Do the cleaning and washing yourself, Shop for daily necessities yourself, Exercise function, Nutrition



Performance Results





	Precision	: 0.8125
✓	Recall	: 1.0
	F1-Score	: 0.896551724137931
✓	Time	: 1.458719253540039

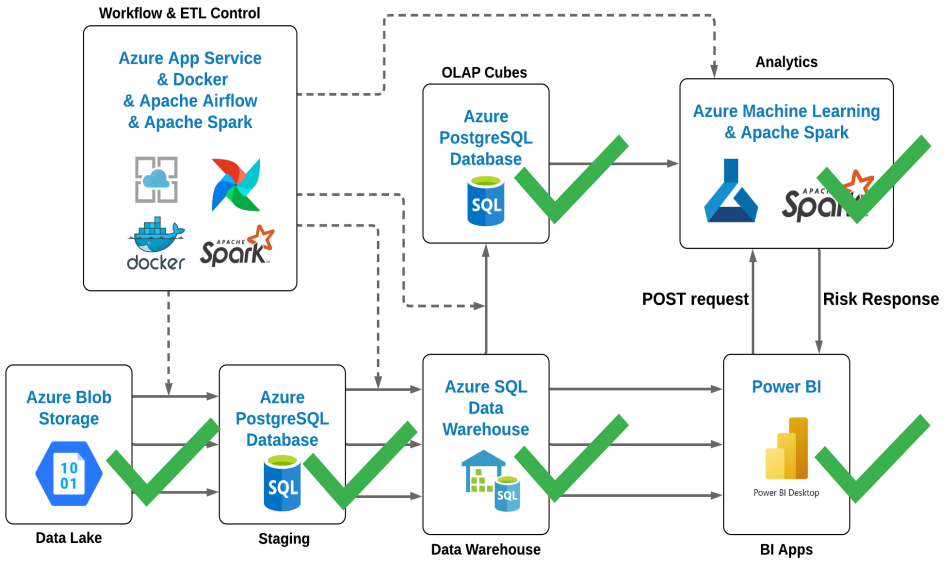
04
Schedule and Role assignment

Finished

Working Process																			
Project Lead : Mr.Natchapol Patamavisut (Bank)																		Done	
Secretary : Ms.Natchariya Wongamnuayporn (Kao)																		In Process	
																		Late	
Scurm Master : Kao & Project Manager : Bank																		Not assign	
Work description	Assign to	Start Date	Mar-21				Apr-21				May-21				Percent (%)	Finish Date	Period Days	Note	
			1	2	3	4	1	2	3	4	1	2	3	4					
Sprint1 : Conceptual design (1/3/2021 - 31/3/2021)																			
Get requirement	All member	1/3/2021													100%	3/3/2021	2		
Midterm Exam	All member	8/3/2021													NA	12/3/2021	5	Midterm Exam	
Requirement Document	Kao,Bank	15/3/2021													100%	20/3/2021	5		
Meeting	All member	27/3/2021													100%	28/3/2021	1		
Presentation	All member	31/3/2021													100%	31/3/2021	1	End Sprint 1	

Working

Sprint2 : System design (31/3/2021 - 26/4/2021)																		
Meeting	All member	31/3/2021														100%	31/3/2021	1	
Create IaC	Eye	31/3/2021														100%	I : 4/4/2021 (II : 10/4/2021)(III : 18/4/2021)(IV : 21/4/2021)(V : 25/4/2021	~ 19	Blob Storage , PostgreSQL and Data warehouse
Programming	Bank	31/3/2021														100%	4/4/2021	5	Manage data to match the data
Demo Visualization	Kao,New	31/3/2021														100%	4/4/2021	5	
Demo Docker	Fuze	31/3/2021														100%	5/4/2021	6	
Meeting	All member	4/4/2021														100%	4/4/2021	1	Update work
Extract and load Data	Fuze	5/4/2021														100%	21/4/2021	16	Upload & Download Postgres
Visualiation	Kao,New	5/4/2021														100%	18/4/2021	13	Dashboard
Power BI POST request API	Kao	12/4/021														100%	22/4/2021	10	
Machine Learning	Bank	5/4/2021														100%	18/4/2021	13	
Testing & Report	Kao,Bank	19/4/2021														100%	20/4/2021	1	
Presentation	All member	26/4/2021														0%	26/4/2021	1	End Sprint 2



Next Step

Sprint3 : Implement & Deployment (26/4/2021 - 10/5/2021)																		
Meetings	All member	26/4/2021														0%	26/4/2021	1	
Deploy Model	Bank	26/4/2021														0%	2/5/2021	6	
Airflow	Bank	26/4/2021														0%	2/5/2021	6	Automate workflow
Deploy Airflow	Fuze	26/4/2021														0%	2/5/2021	6	
Spark (Olap cube)	New,Kao	26/4/2021														0%	2/5/2021	6	Transform Data
Data Profiling	Eye	26/4/2021														0%	2/4/2021	7	Using great_expectation
Testing & Report	Kao,Bank	4/5/2021														0%	7/5/2021	3	
Meeting	All member	10/5/2021														0%	10/5/2021	1	End Sprint 3
Sprint 4 : Testing (10/5/2021 - 31/5/2021)																			
Meetings	All member	10/5/2021														0%	10/5/2021	1	
Testing Model	Bank	10/5/2021														0%	18/5/2021	8	
Testing Pipeline	Eye	10/5/2021														0%	18/5/2021	8	
Testing Infrastructure	Fuze	10/5/2021														0%	18/5/2021	8	
Testing Dashboard	New	10/5/2021														0%	18/5/2021	8	
Testing & Report	Kao,Bank	19/5/2021														0%	21/5/2021	3	All testing & Report
Final Presentation	All member	31/5/2021														0%	31/5/2021	1	End Sprint 4

Members & Responsibility

Ms.Natchariya Wongamnuayporn
(Kao)
61070507204

Mr.Natchapol Patamawisut
(Bank)
61070507205

Ms.Thanaporn Cheenthada
(Eye)
61070507209

Mr. Rungwigrai Payakkanuwat
(New)
61070507219

Mr. Prakasit Chaiphet
(Fuze)
61070507230

Responsibility
Bank : Leader , Programmer
Kao : Secretary , Tester
Eye : Infrastructure
New : Designer
Fuze : Deployment

Reference

- https://www.siphhospital.com/th/news/article/share/857/Acutecoronarysyndrome
- https://www.mayoclinic.org/diseases-conditions/acute-coronary-syndrome/symptoms-causes/syc-20352136#:~:text=Acute%20coronary%20syndrome%20is%20a,damaged%20or%20destroyed%20heart%20tissue.
- https://www.heart.org/en/health-topics/heart-attack/about-heart-attacks/acute-coronary-syndrome