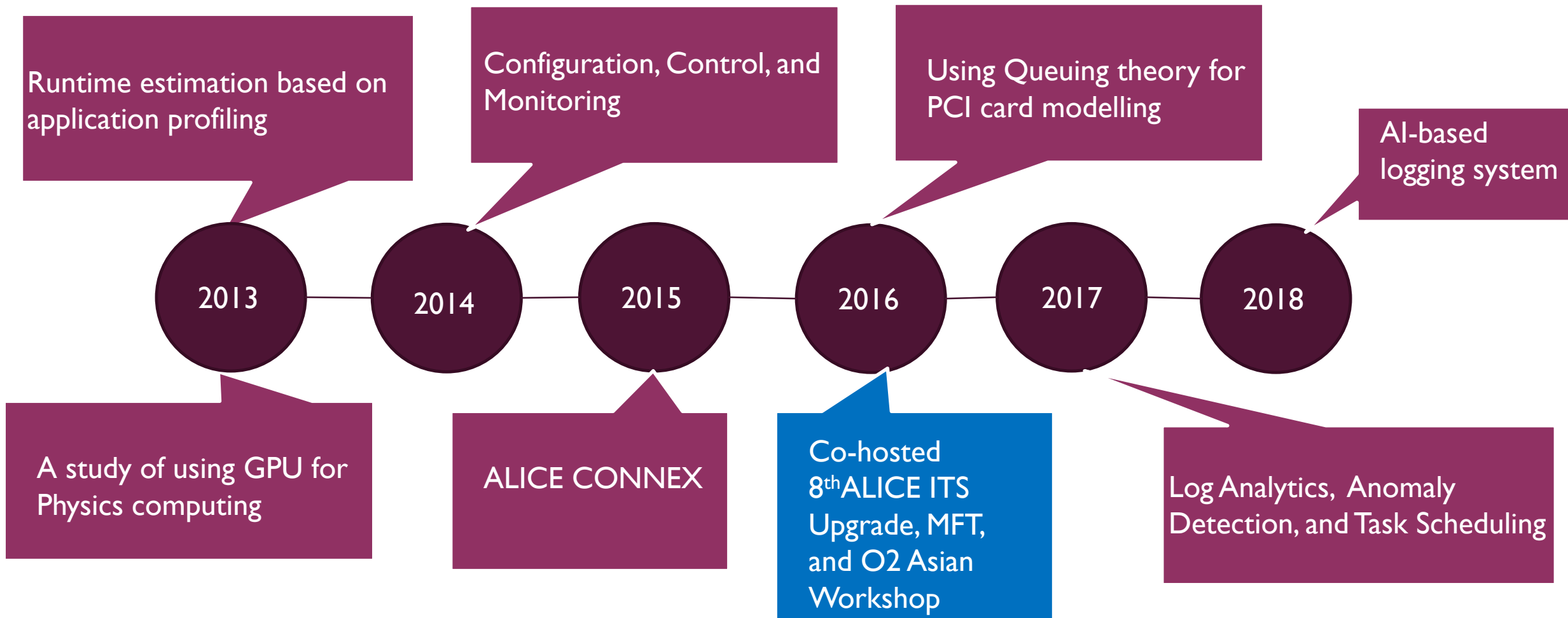

AI-BASED LOGGING SYSTEM FOR ALICE O2 FACILITIES

PHOND PHUNCHONGHARN



OVERVIEW ABOUT KMUTT COLLABORATION

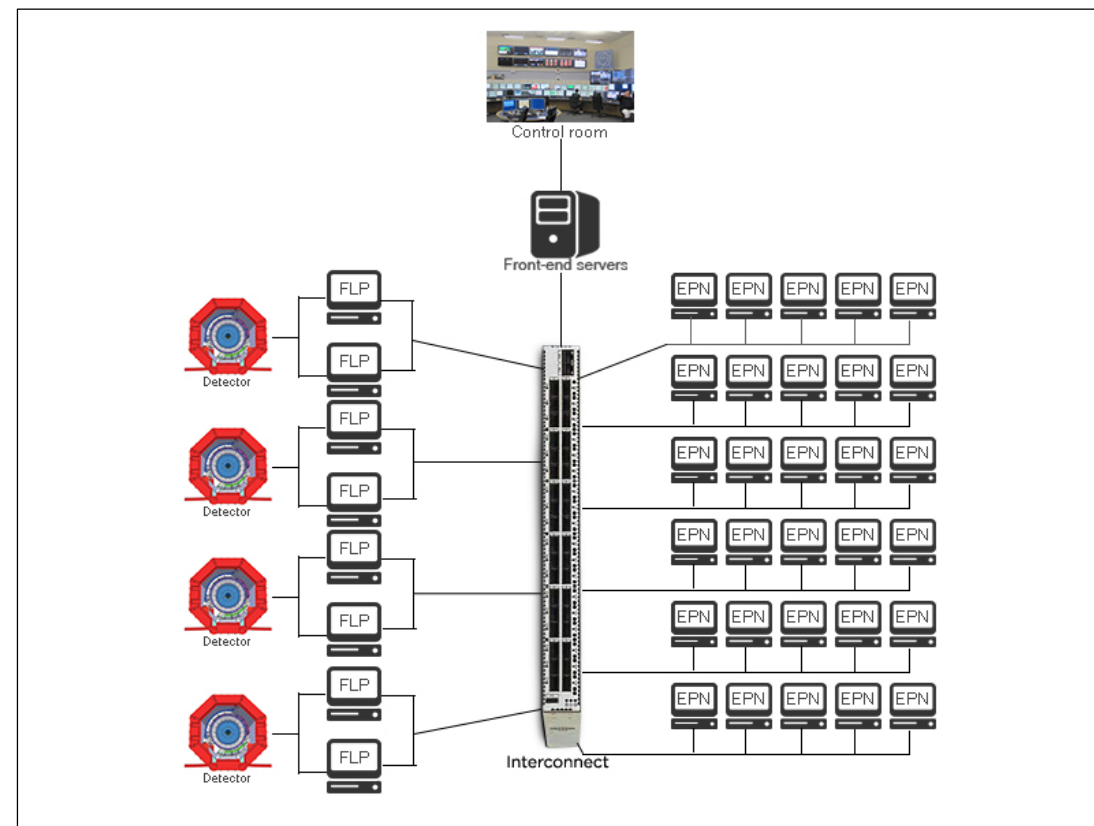


OUTPUT

- 9 Publications
- 7 Graduated Students
 - 3 of them working in Companies in Thailand
 - 3 of them studying in Ph.D. in US
 - 1 of them studying in Ph.D. in UK
- 4 Current Students (for 2 on going projects)
- 9 Master Students (in the next 3 years for AI-based logging system project)

ALICE O2 PROJECT NEEDS

- In O2 facilities, there are about 2000 nodes under heterogeneous environment
- Each node will generate the system logs, service logs, and application logs.
- These log messages can be used for preventive maintenance
- KMUTT has proposed to develop an “AI-based Logging System for O2 facilities”



O² environment

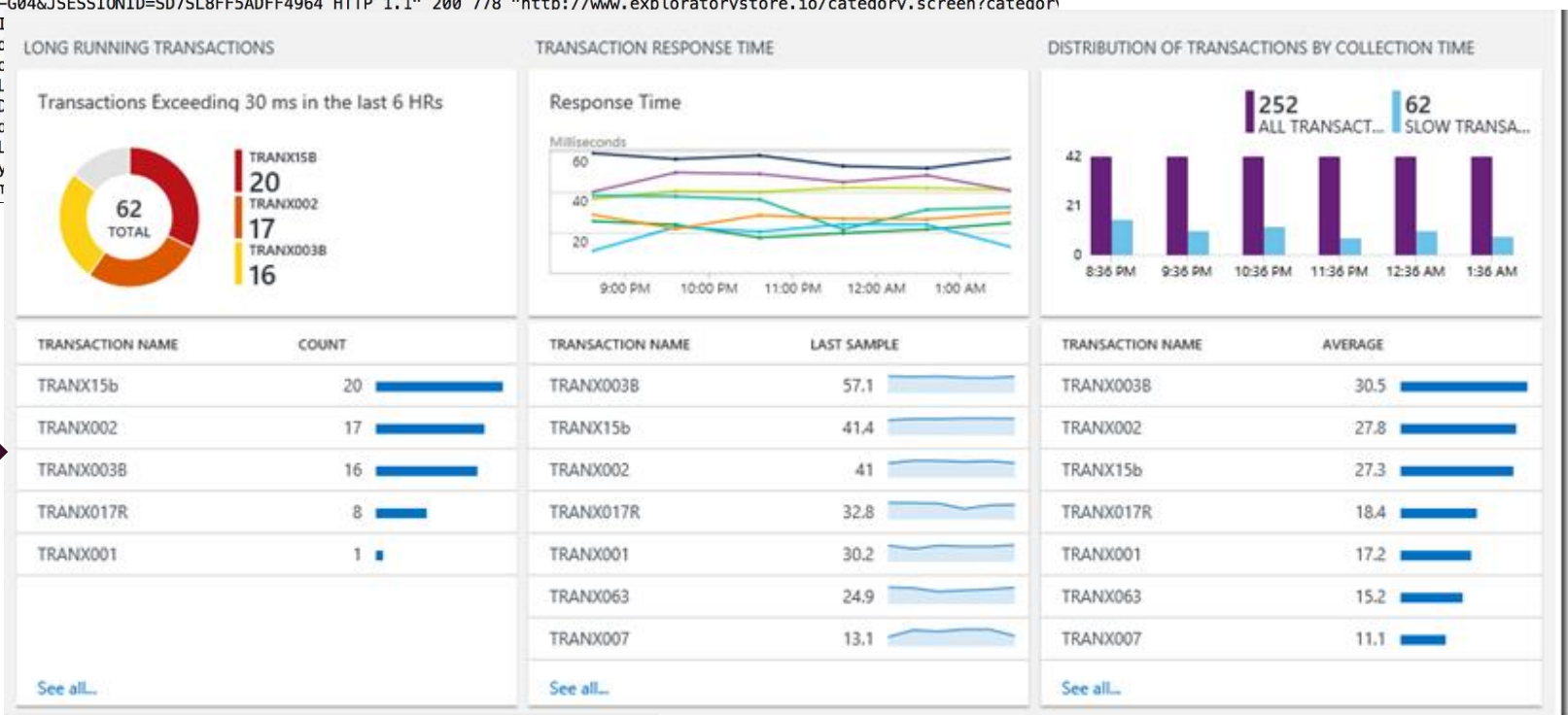
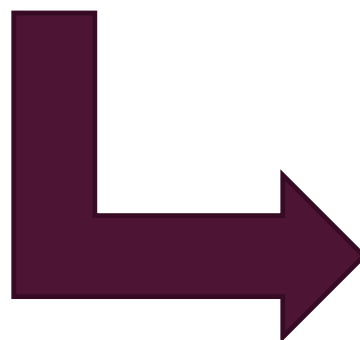
PREVENTIVE MAINTENANCE

- Preventive maintenance is maintenance that is regularly performed on a part of system to reduce the chance of system failure
- It is performed while the system is still working so that it does not break down unexpectedly
- Advantages:
 - Increase asset life span
 - Cost effective (saves energy and resources)
 - Efficient productivity
 - Reduces unplanned downtime

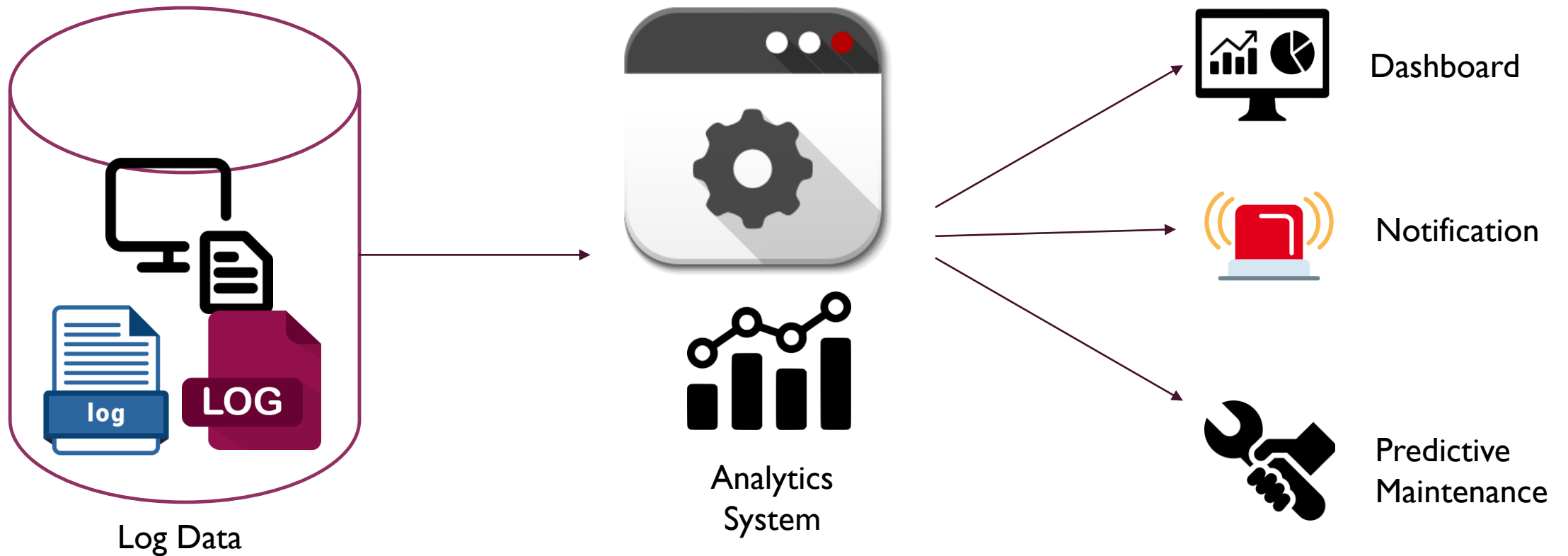
LOG DATA

```

209.160.24.63 -- [03/Mar/2016:18:22:16] "GET /product.screen?productId=WC-SH-A02&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 3878 "http://www.google.com" "Mozilla/5.0 (Windows NT 6.1; \
209.160.24.63 -- [03/Mar/2016:18:22:16] "GET /oldlink?itemId=EST-6&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 1748 "http://www.exploratorystore.io/oldlink?itemId=EST-6" "Mozilla/5.0 (\
209.160.24.63 -- [03/Mar/2016:18:22:17] "GET /product.screen?productId=BS-AG-G09&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 2550 "http://www.exploratorystore.io/product.screen?product:
209.160.24.63 -- [03/Mar/2016:18:22:19] "POST /category.screen?categoryId=STRATEGY&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 407 "http://www.exploratorystore.io/cart.do?action=remove
209.160.24.63 -- [03/Mar/2016:18:22:20] "GET /product.screen?productId=FS-SG-G03&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 2047 "http://www.exploratorystore.io/category.screen?catego
209.160.24.63 -- [03/Mar/2016:18:22:20] "POST /cart.do?action=addtocart&itemId=EST-21&productId=FS-SG-G03&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 1201 "http://www.exploratorystore.:
209.160.24.63 -- [03/Mar/2016:18:22:21] "POST /cart.do?action=purchase&itemId=EST-21&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 486 "http://www.exploratorystore.io/cart.do?action=addt
209.160.24.63 -- [03/Mar/2016:18:22:22] "POST /cart/success.do?JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 3280 "http://www.exploratorystore.io/cart.do?action=purchase&itemId=EST-21" "
209.160.24.63 -- [03/Mar/2016:18:22:21] "GET /cart.do?action=remove&itemId=EST-11&productId=WC-SH-A01&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 3619 "http://www.exploratorystore.io/o
209.160.24.63 -- [03/Mar/2016:18:22:22] "GET /oldlink?itemId=EST-14&JSESSIONID=SD0SL6FF7ADFF4953 HTTP 1.1" 200 1352 "http://www.exploratorystore.io/cart.do?action=addtocart&itemId=EST-
112.111.162.4 -- [03/Mar/2016:18:26:36] "GET /product.screen?productId=WC-SH-G04&JSESSIONID=SD7SL8FF5ADFF4964 HTTP 1.1" 200 778 "http://www.exploratorystore.io/category.screen?category
112.111.162.4 -- [03/Mar/2016:18:26:37] "POST /cart.do?action=addtocart&itemI
112.111.162.4 -- [03/Mar/2016:18:26:38] "POST /cart.do?action=purchase&itemIc
112.111.162.4 -- [03/Mar/2016:18:26:38] "POST /cart/error.do?msg=CreditDoesNc
112.111.162.4 -- [03/Mar/2016:18:26:37] "GET /category.screen?categoryId=NULL
112.111.162.4 -- [03/Mar/2016:18:26:38] "GET /oldlink?itemId=EST-7&JSESSIONID
74.125.19.106 -- [03/Mar/2016:18:32:15] "GET /cart.do?action=addtocart&itemIc
74.125.19.106 -- [03/Mar/2016:18:32:15] "GET /category.screen?categoryId=NULL
117.21.246.164 -- [03/Mar/2016:18:36:02] "POST /cart.do?action=changequantity
117.21.246.164 -- [03/Mar/2016:18:36:03] "POST /cart.do?action=addtocart&ite
  
```



LOG ANALYTICS SYSTEM



FUNCTIONALITIES

- The system must be able to:
 - provide centralized access to system and service logs
 - identify abnormal events/behaviors and generate alarms in the monitoring infrastructure
 - extract new insights from log data to increase operational efficiency
 - analyze the survival period of the cluster and recommend the pre-maintenance in order to reduce the cost and time of maintenance
 - correlate system and service logs with application logs to perform root cause analysis and assist experts in incident management

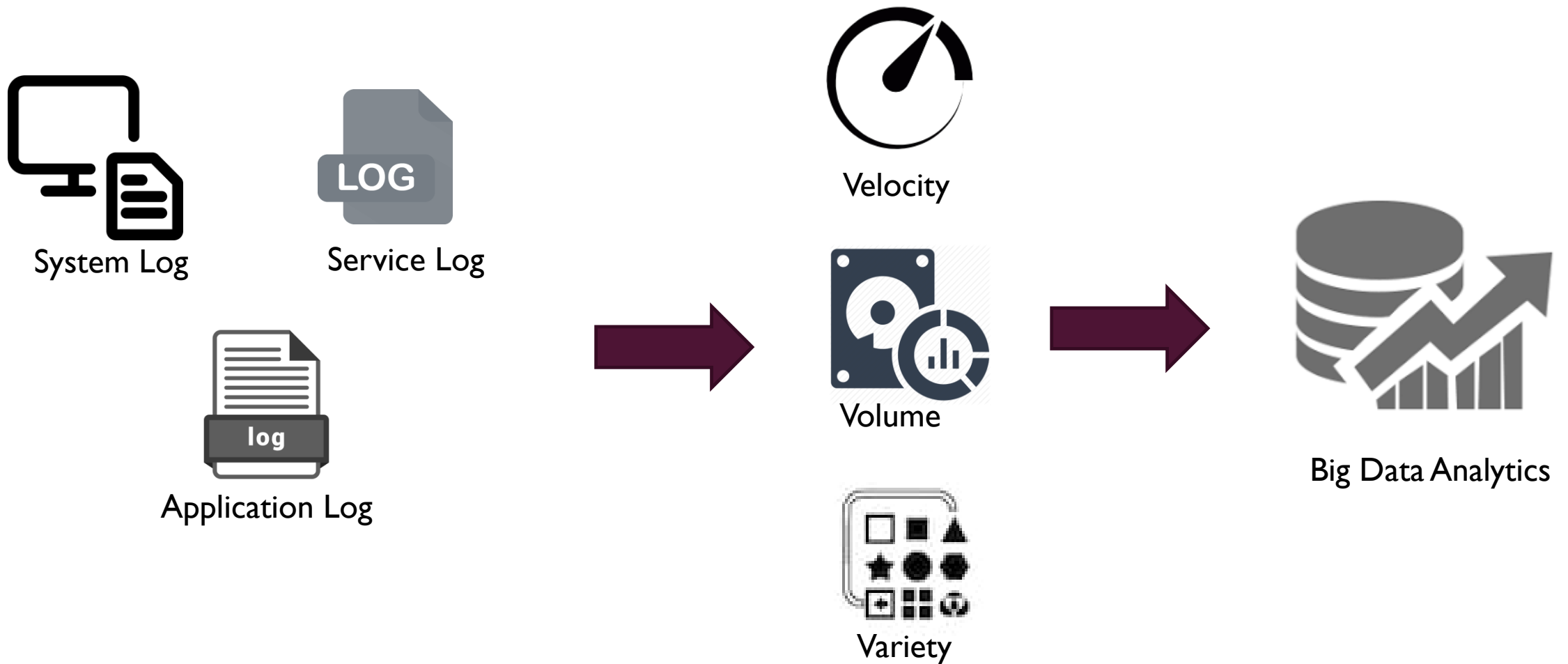


KMUTT CONTRIBUTIONS

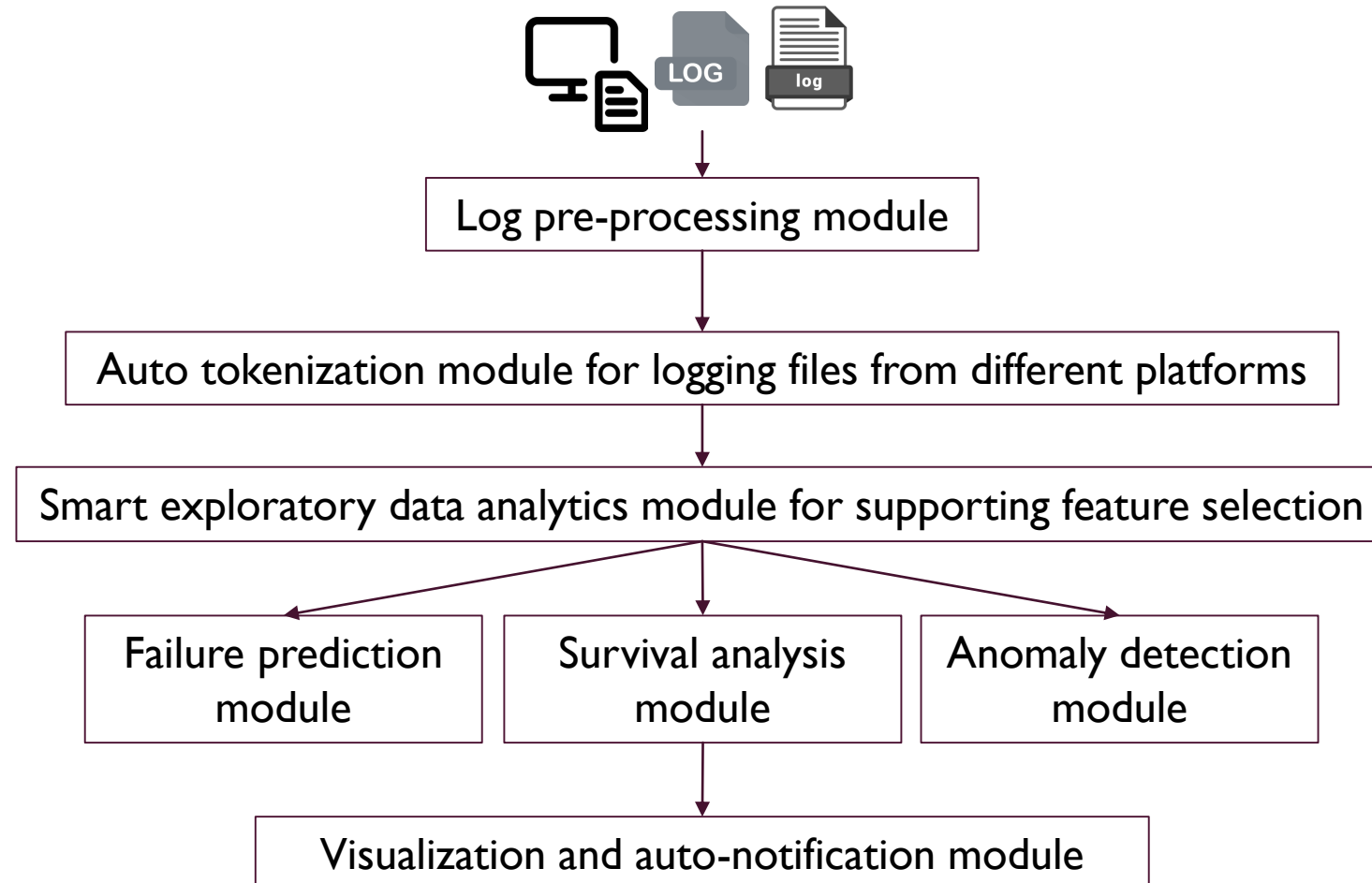
- Our team will take an ownership of the AI-based logging system in the full stack of software engineering activities:
 - Collecting the requirement from CERN
 - Designing
 - Implementing
 - Testing
 - Deploying
 - Maintaining
 - Data Analytics



BIG DATA ANALYTICS



LOGGING ANALYSIS FRAMEWORK



TENTATIVE SCHEDULE

Tasks	Tentative Schedule
Requirement Collection and System Specification	Nov. 2018 – Mar. 2019
System Architectural and Component Design	Mar. 2019 – Jun. 2019
System Development	Jun. 2019 – Dec. 2019
System Validation	Dec. 2019 – Mar. 2020
System Maintenance	Mar. 2020 – Dec. 2021
Data Analytics	Jan. 2019 – Dec. 2021

CONCLUSION

- We will develop an AI-based logging system for the O2 facilities in order to support the operational team
- The system will establish the preventive maintenance for ALICE
- This project duration is 3 years for the first phase
- The project will obtain the funding from Ministry of Science and Ministry of Digital Economy, Thailand
- Currently, we are in the collecting the requirements and specifying the standard for the system



THANK YOU !!