ASEAN Forum for Software Defined System on Disaster Mitigation and Smart Cities

Project Status Updates

ASEAN IVO Forum 2017

24 November 2017, Hanoi, Vietnam

Outline

- Project Background
- Focus Areas
  - Visualization of Distributed Environmental Data
  - SDN-IP Peering for IoTs Data Transmission (Resilient Transnational Network with SDN-IP)
  - SDN/NFV Infrastructure for Disaster Mitigation and Smart Cities
- Project Activities
- Current Reference Architecture/Blueprint
- Presentations and Publications

Software Defined System on Disaster Mitigation and Smart Cities

ASEAN IVO

Goals: This project addresses the impact of climate change on cities and urbanization, with particular relevance to the priority area of improving environmental resilience and more specifically in disaster mitigation.

Activities:

- Develop a Software Defined System architecture blueprint for disaster mitigation, crisis communication, and emergency management that can monitor and report disaster events in near-real-time.
- Investigate programmability aspects of IoTs technologies, networking, and edge/cloud computing platforms.
- Conduct field testing of potential use cases using NICT's existing testbeds such as JGN-X, Starbed, and JOSE.
- Organize workshops with ASEAN members to disseminate R&D results.
- Dialogue with PRAGMA (NSF, US), CENTRA (NSF, US), and CECEA (Taiwan) on similar R&D challenges to accelerate project activities.

Software Defined System on Disaster Mitigation and Smart Cities

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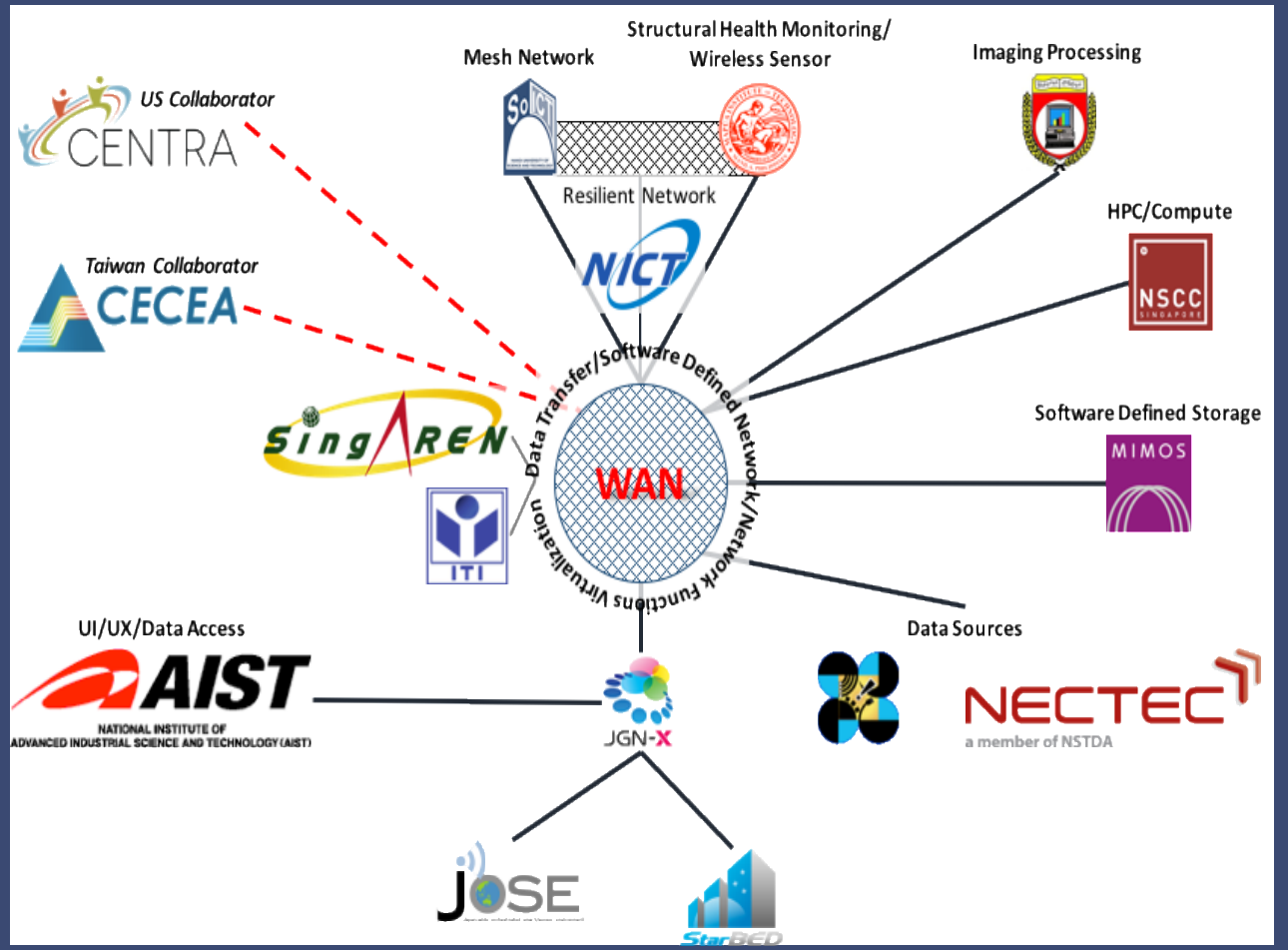
	Member	Affiliate Institution	Country
1	Jason HAGA	AIST	Japan
2	Eiji Kawai	NICT	Japan
3	Hiroshi Kumagai	NICT	Japan
4	Hong H. ONG	MIMOS	Malaysia*
5	Jing Yuan LUKE	MIMOS	Malaysia
6	Myint Myint SEIN	University of Computer Studies, Yangon	Myanmar
7	Alejandro H. Ballado Jr.	Mapua Institute of Technology	Philippines
8	Jelina Tanya H. Tetangco	ASTI	Philippines
9	Bu Sung LEE	SINGAREN	Singapore
10	Kanokvate Tungpimolrut	NECTEC	Thailand
11	Hong Son NGO	Hanoi University of Science and Technology	Vietnam
12	Van Dzung DINH	Vietnam National University (Hanoi)	Vietnam

Project Partners
(7 countries, 10 institutions)



Project Partners Work Areas

Software Defined System on Disaster Mitigation and Smart Cities

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	WP1: Visualization of Distributed Environmental Data	WP2: SDN-IP Peering for IoTs Data Transmission	WP3: SDN/NFV Infrastructure
Objectives	• To create reliable software defined distributed storage platform for seamless access and visualization	• To federate IP networks with SDN-IP for resilient and effective infrastructure	• To build a ASEAN SDN/NFV Testbed (Philippines, Vietnam, Myanmar, Japan, Taiwan)
Problems to be solved	• To ensure consistent access to environmental data • To ensure data resiliency • To facilitate data discovery • To address data security • To enable ease and standard visualization	• Interconnection through legacy internet by IP tunneling • Migration to native SDN connection (work with POC for SDN/IP (performance, feasibility) • Integration with access network such as Free space optics • Automatic configuration of test environment on PRAGMA-ENT	• Reliable/resilient network • IoTs enabled transport system (environmental sensors and gateways/MQTT broker) • Case study 1: Early Warning Systems (e.g. flood, typhoon, earthquake monitoring) • Case study 2: Smart Environment
Team members	• ASTI (Data resource, Data Management) • MIMOS (Distributed Object Storage) • AIST (Data Visualization) • NECTEC (Data resource) • NICT (Testbed, SDN, NFV)	• HUST • NICT • ASTI • NECTEC • SINGAREN	• VNU • HUST • MAPUA • UCSY • NICT
Additional collaborators	• NCHC (Additional use cases) • NAIST (SDN, NFV, PRAGMA-ENT)	• NCHC • Osaka U	• NCHC • Osaka U

Software Defined System on Disaster Mitigation and Smart Cities

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	Phase 1:	Phase 2:	Phase 3:
WP1: Data Visualization and Storage	• Setup and configure the distributed object storage on the NICT Testbed (JOSE) • Optimization and tuning • Data harvesting (Data migration and validation, e.g. environmental data, NOAH data, Dam data)	• Data management and access methods, e.g., VO concept, ”Dropbox” like. • Data visualization (SAGE2)	• Software Defined Storage Infrastructure (leveraging SDN-IP and SDN/NFV)
WP2: SDN-IP	• Connect JAPAN (NICT) – Taiwan (NCHC) with SDN-IP • Introduce JOSE and IOT testbed to SDN-IP	• Connect Vietnam (HUST) and Philippines (ASTI) with IP tunneling and migrate • Building software based environment for SDN (Te-Lung) • IP tunneling base OpenFlow environment	• IoT testbed inclusion • Inclusion of application
WP3: SDN/NFV Infrastructure	• Establish a local SDN/NFV testbeds	• Establish the international connections between the testbed and with the NICT JOSE, RISE and PRAGMA-CENTRA, CECEA	• Set-up trials/tests of proposed reference solutions(resilient/IoTs)

Project Activities

January - March 2016

- ASEAN IVO Forum @ Philippine in January
- Proposal submitted in February.
- Proposal approval received at end of March

End of April 2016

- Project Kick-off Meeting (via teleconference)

May-August 2016

- Members interaction on work areas and their project in progress
- Presentation @ APAN 42

September 2016 - January 2017

- Project team 1st Meeting @ PRAGMA-31, Thailand
- 3 sub-projects/work areas identified
- ASEAN IVO Forum @ Hanoi (Project review)
- Project team 2nd Meeting @ SEAIP 2016, Taiwan

February – April 2017

- Presentation @ CENTRA2 (via web presence)
- Project report submitted
- Confirmation on project continuation
- SDN-IP Peering between JGN-X and NCHC completed
- Documentation completed

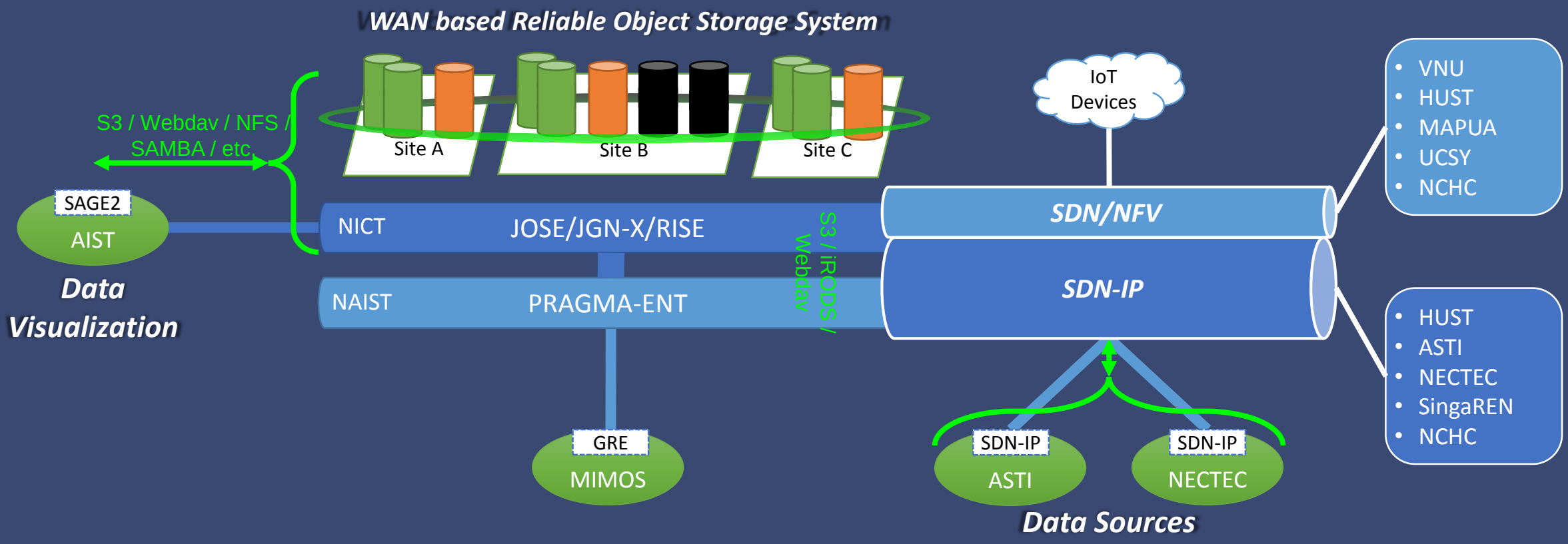
May - October 2017

- Virtual Storage Cluster completed on JGN-X/JOSE
- ASTI NOAH test data set populated
- Project team 3rd meeting, KL
- SDN-NFV local testbeds in progress
- SDN-IP Peering between NECTEC and JGN-X Completed
- Sample AirBox data populated into virtual storage cluster

November 2017

Today

Reference Architecture (updated after meeting @ September 2017)*



* *Work in progress*

Related Presentations and Publications

- “eResearch Australasia BoF on Transnational Collaborative Research on Smart and Connected Communities”, BoF session eResearch Australasia, 2017 (NICT)
- “ASEAN Forum for Software Defined System on Disaster Mitigation and Smart Cities”, CENTRA 2 All-Hands Meeting, 2017 (MIMOS)
- “Optimal Route Assessment for Emergency Vehicles Travelling on Complex Road Network”, 11th Multi-disciplinary International Workshop on Artificial Intelligence, 2017 (UCSY)
- “Effective Emergency Response System by Using Improved Dijkstra’s Algorithm”, 15th International Conference on Computer Applications, 20167“Effective Evacuation Route Strategy during Natural Disaster”, APAN 44, 2017 (UCSY)
- “Optimal Route Finding for Weak Infrastructure Road Network”, Genetic and Evolutionary Computing Proceedings of the Tenth International Conference on Genetic and Evolutionary Computing, 2017 (UCSY)
- “Quantitative Risk Assessment of Container Based Cloud Platform”, AINS 2017 (MIMOS)
- “CLOF: A proposed Containerized Log management Orchestration Framework”, ICOS 2017 (MIMOS)
- “Reference Architecture for Search Infrastructure”, ICCSCE 2017 (MIMOS)
- “ASEAN IVO Project: Software Defined System on Disaster Mitigation and Smart Cities”, APAN 42, 2016 (AIST)
- “Visualization of Distributed Environmental Data”, CENTRA Webminar, SEAIP 2016 (MIMOS)
- “Ext4, XFS, BtrFS and ZFS Linux File Systems on RADOS Block Devices (RBD): I/O Performance, Flexibility and Ease of Use Comparisons”, ICOS 2016 (MIMOS)

Thank you