Summer Internship Project Showcase

Automating IoT Connection in NUS Campus

Presented by
Khairul Iman
Hong Wei Yang

Agenda

01 Introduction

Process Flow
Pain Points
Developmental timeline

02 Architecture & Implementation

Architecture
Core Implementation

03 Challenges Faced

04 Project Outcomes

05 Demo

06 Future Improvements & Conclusion

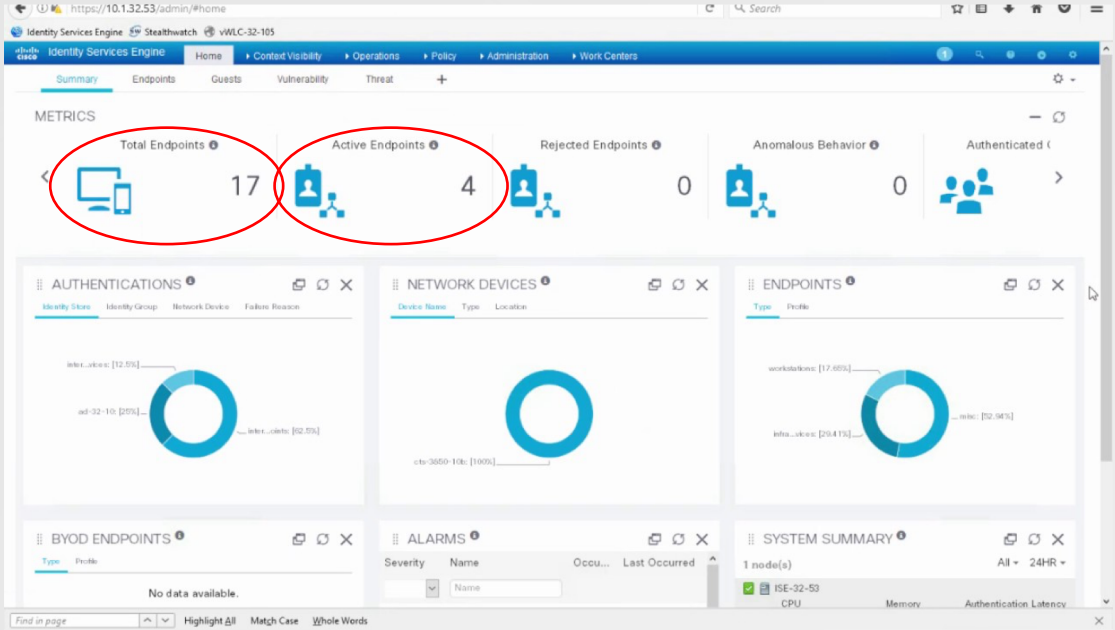
01

Introduction & Process Flow

How IoT Devices Connect to Campus Network

MAC

Media Access Control Address



Original Process Flow

Wants IoT device to be connected to campus network

Open a ticket via NUS nTouch or by emailing IT Care with relevant information of his device

Network administrator will then configure the device inside Cisco ISE Portal

Upon completion, user can now connect his device to campus network

Pain Points on Existing Flow

Manual Provisioning

Currently, the network administrators are provisioning network access to researcher's IoT devices manually.

Ad-Hoc Requests

They are attending to such provisioning on a case-by-case basis, through NUS ticketing system.

Inefficient delay

Provisioning network access to IoT devices might take up to 1 week, for a very simple and repetitive task.

Solution

IoT provisioning in Cisco ISE is a repetitive task

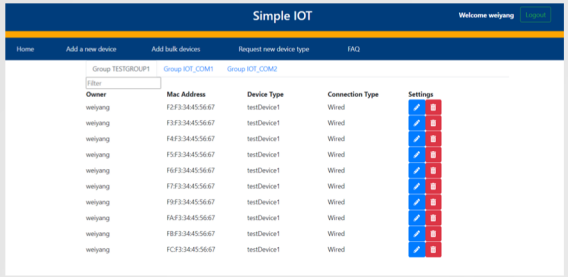
Automate the provisioning process is the key solution

Aim

- Free up network administrator’s time
- Improve the waiting time to provision network access down to an **instant**

New Process Flow

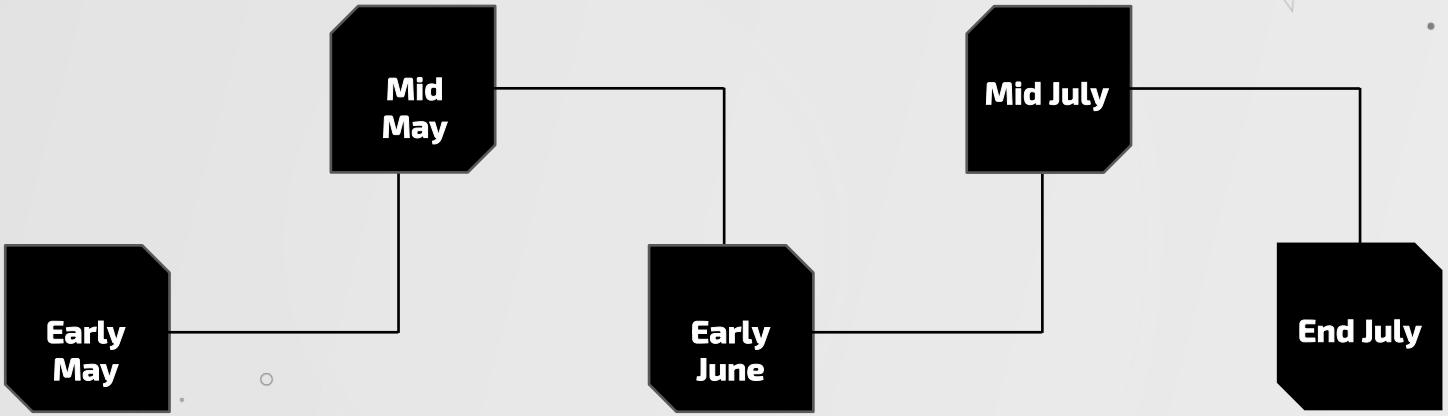
Wants IoT device to be connected to campus network



Logs in to Simpleiot .nus.edu.sg and keys in his device information.

Provisioning of campus network access is instant, user can start connecting his device **immediately**

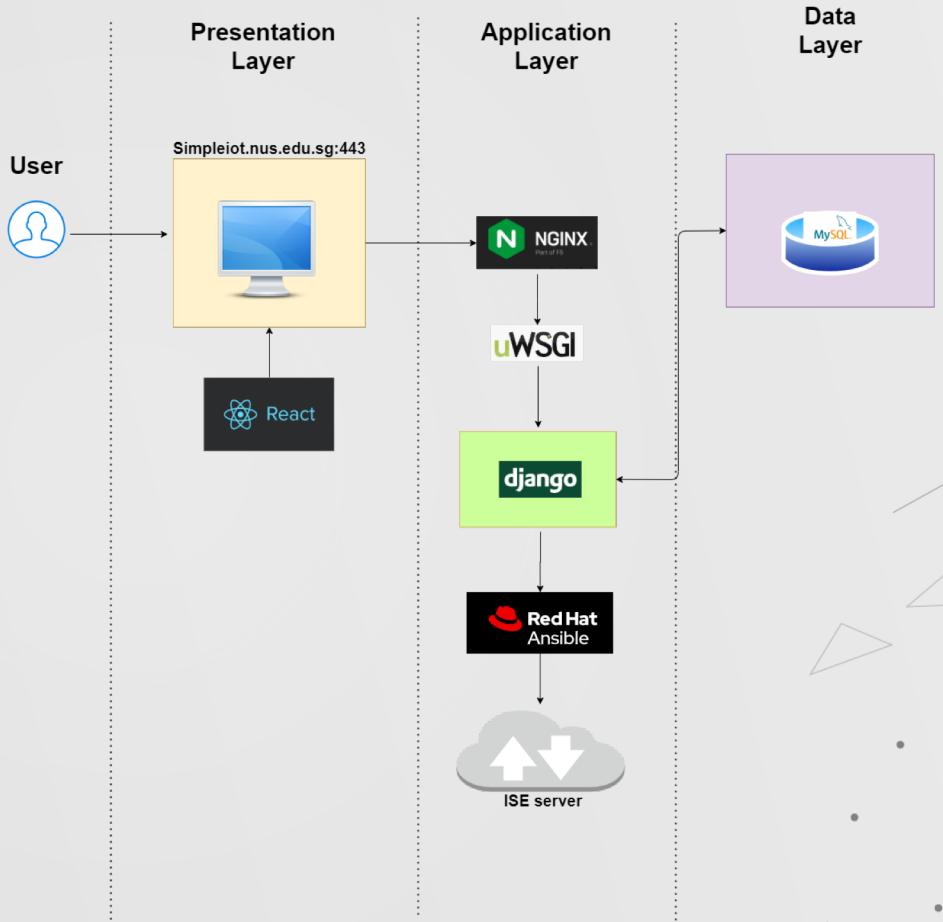
Timeline


Early May
Handing over previous project from NSWS & Introduction to Ansible and Cisco ISE
Mid May
Architecture & Database Design
Early June
Implementation, Staging & Deployment to Production Server
Mid July
User Testing, Documentation & Preliminary Review
End July
Final Review & Preparation of deliverables

02

Architecture

System Architecture: simpleiot.nus.edu.sg



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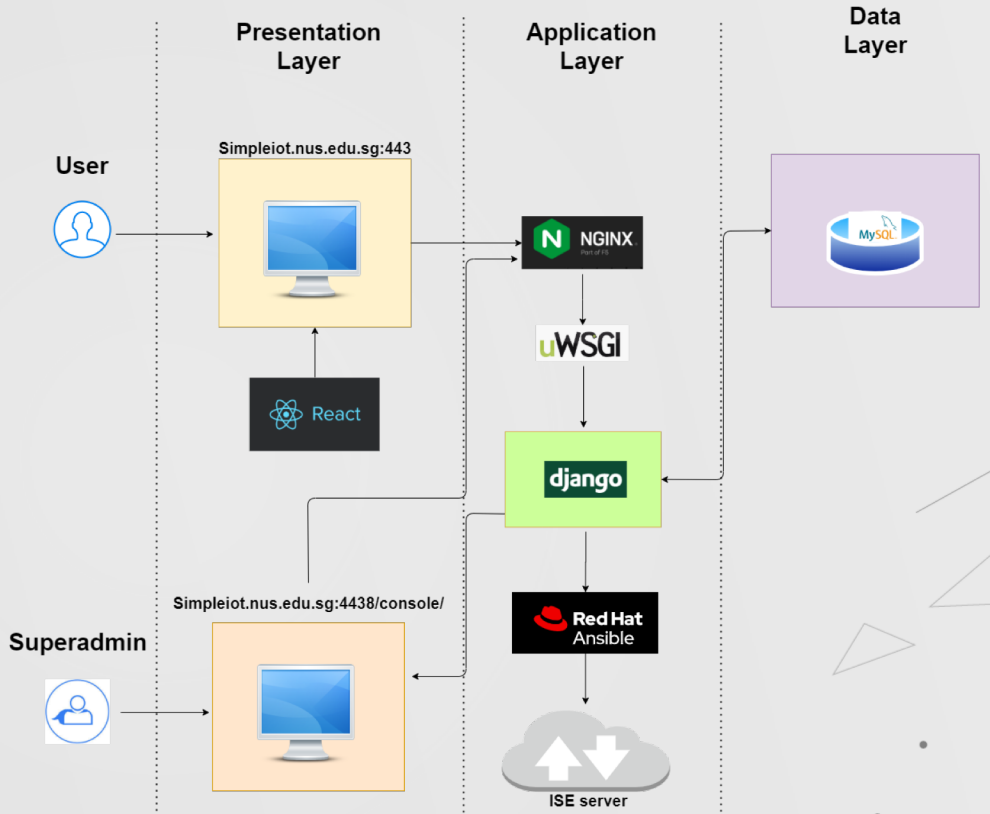
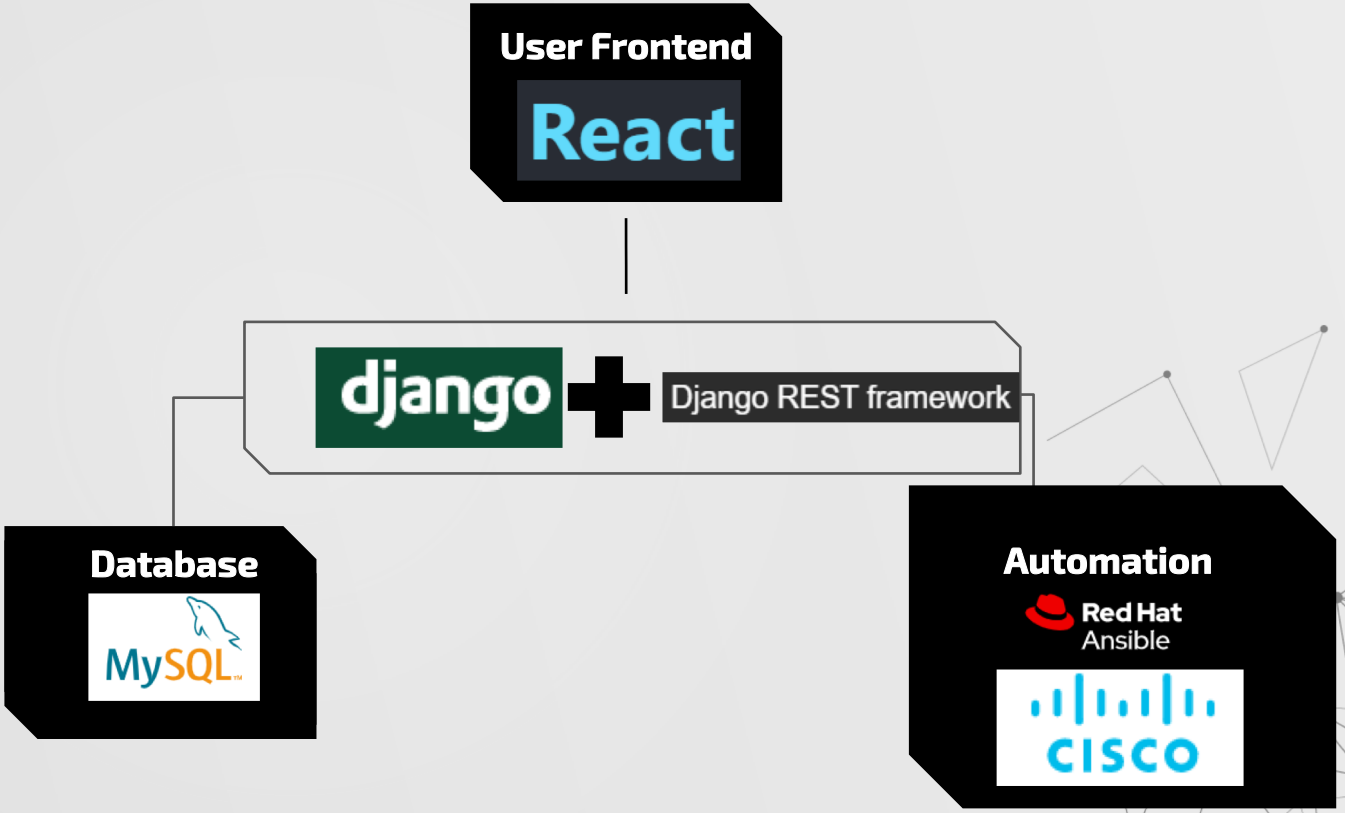


Core Implementation and rationale



03

Challenges Faced

Challenges

Complexity of Project

Adapting to New Software

Internal Security Protocols

04

Project Outcomes

Project Outcomes

Scalable Automation Platform

IoT Provision Process Redefined and and can be achieved instantly

Operation Efficiency

Engineers can perform more higher value tasks

Better User Experience

Improve the user Experience by reducing the turnaround time

05

Demo

06

Further Improvements & Conclusion

Key Improvements

More automation features could be added, such that network administrators need not set up the initial Authorisation Profile in Cisco ISE

Higher Automation

Dashboard interface can be more fully flushed out. This would provide a more seamless user experience for researchers and network administrators.

UI/UX

Enable the users in the allowed list to login using their NUSNET credentials

Login integrations with AD

Final thoughts

Rewarding

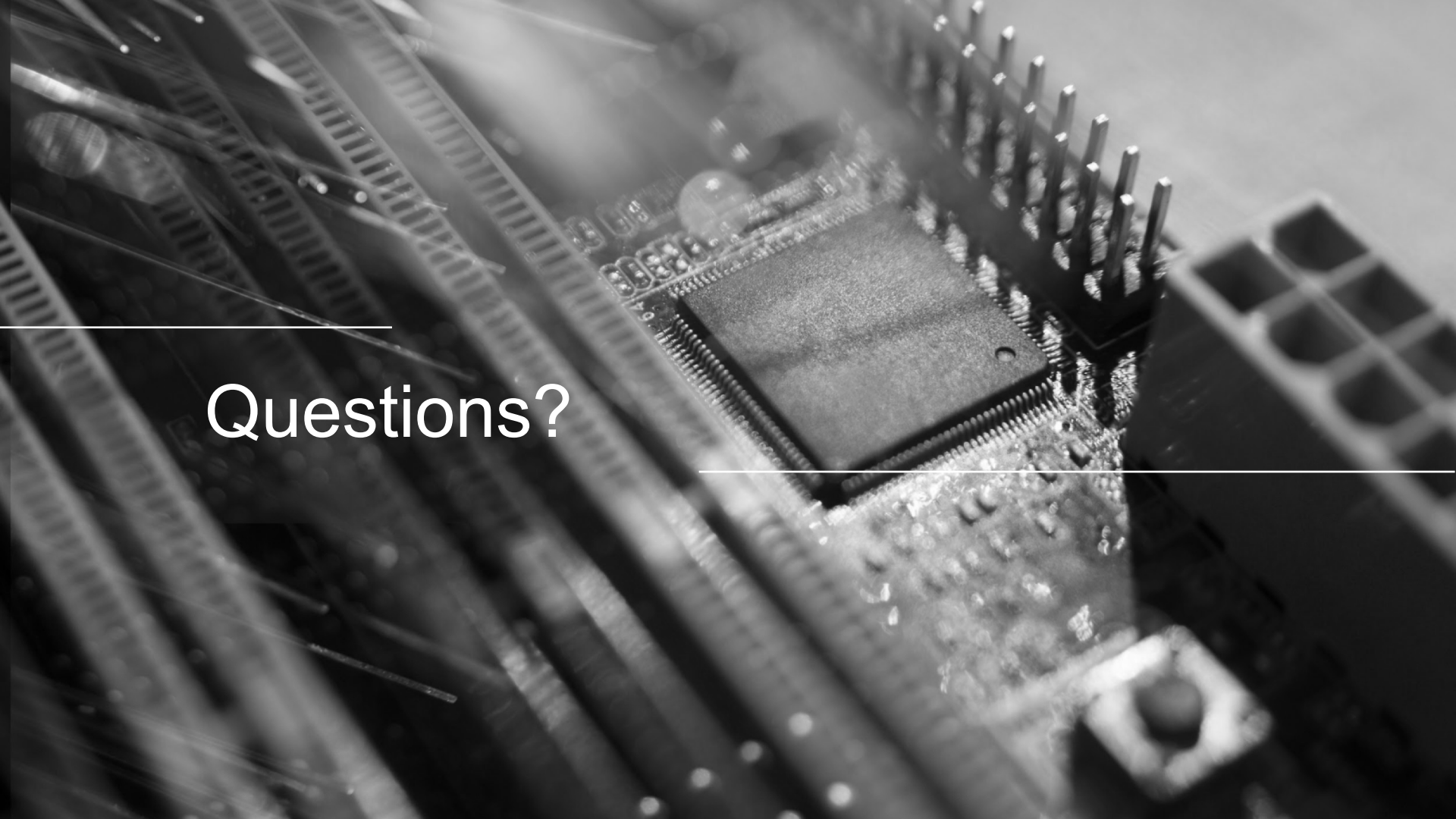
This was truly a rewarding project to be part of.

Interesting

We learnt a great deal of new skills, such as deployment and working with RESTful APIs.

Independance

Doing things on my own is ok, but it is also okay to ask for help.


Questions?