

How to Stay One Step Ahead of Floods

Final Presentation APIE CAMP #6



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THE PROBLEM WE'RE SOLVING

Flooding 'paralyzes' Bekasi overnight

★ What Happened?

- Flash floods hit Bekasi suddenly at night, leaving residents helpless.
- Water levels surged rapidly—some reaching roof height within hours.
- Families had no time to evacuate or save their valuable belongings.

? Why Did It Happen?

- Extreme rainfall overwhelmed drainage systems.
- Lack of real-time warnings left people unprepared.



WHEN FLOODS STRIKE WITHOUT WARNING



Rp 3 Trillion

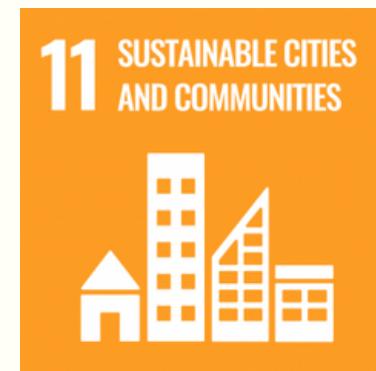
Economic lost

61,000 lives

Left homeless

145.7 Ha

Affected area



Lesson : The Need for Early Warning Flooding

Immediate alerts could have saved lives and assets.



SMART TECHNOLOGY FOR LIFE-SAVING ALERTS

FLows (Flood Warning System)

To ensure real-time flood detection and rapid response, we deploy IoT sensors for monitoring water levels, rainfall, and soil moisture, combined with edge computing for instant data processing. A cloud-based DNS system ensures reliable storage and long-term flood prediction.



 Network Deployment

 DNS Configuration

 Cloud Monitoring

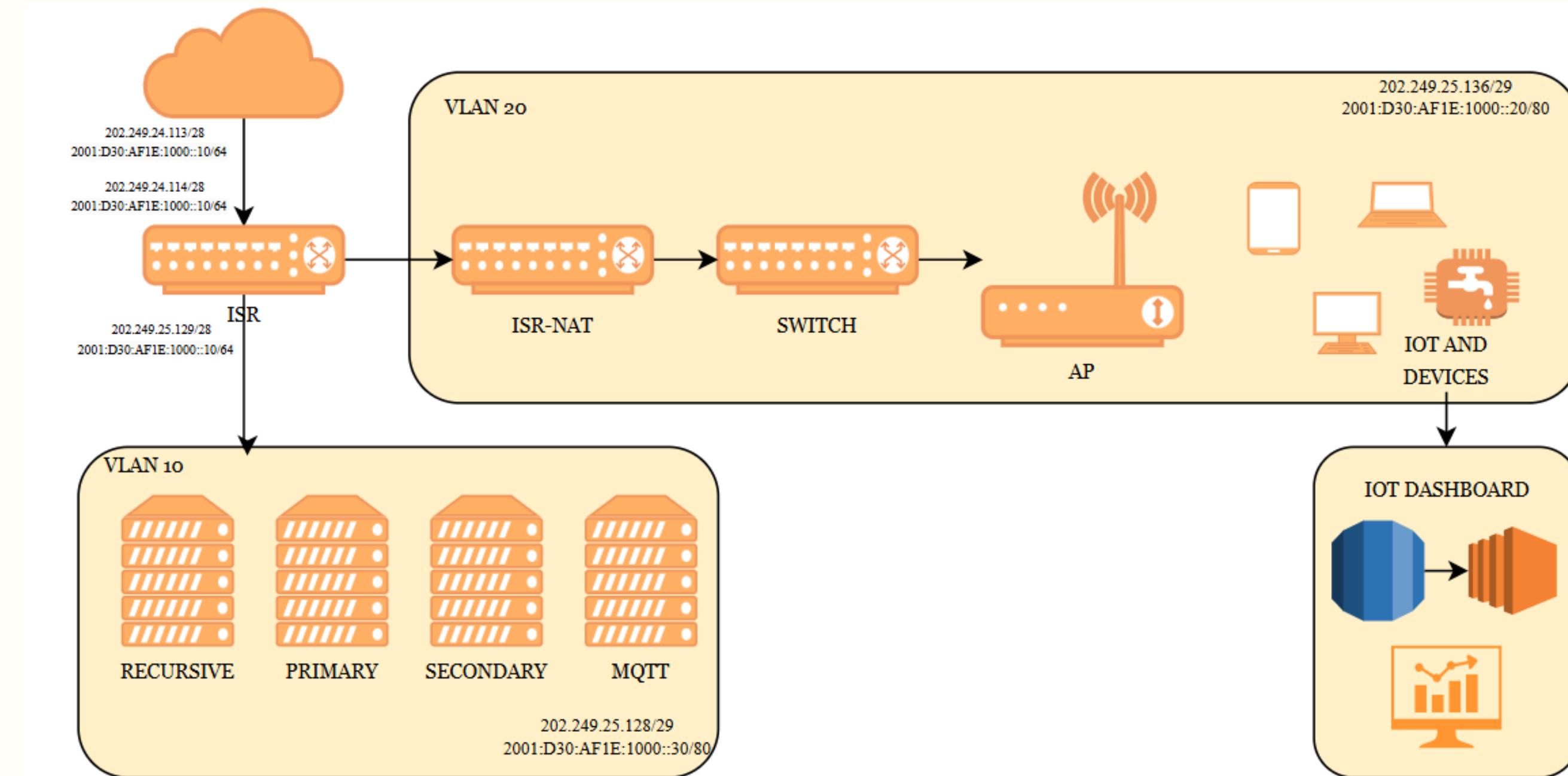
 Virtualization

 Sensor Deployment

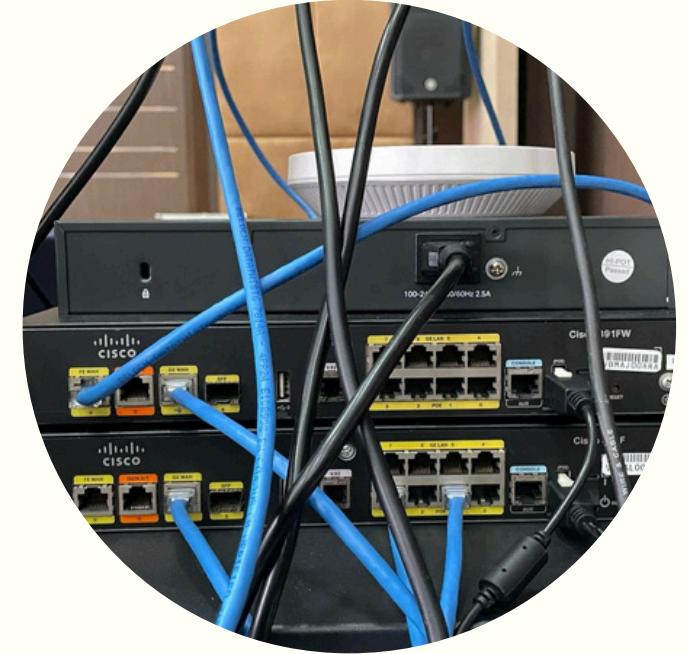
 MQTT Protocol

 Emergency Alert

NETWORK TOPOLOGY



NETWORK DEPLOYMENT RECAP



Physical Configuration

Use RJ45 with CAT6 UTP cables → Enhances bandwidth and minimizes signal loss

ISR Configuration

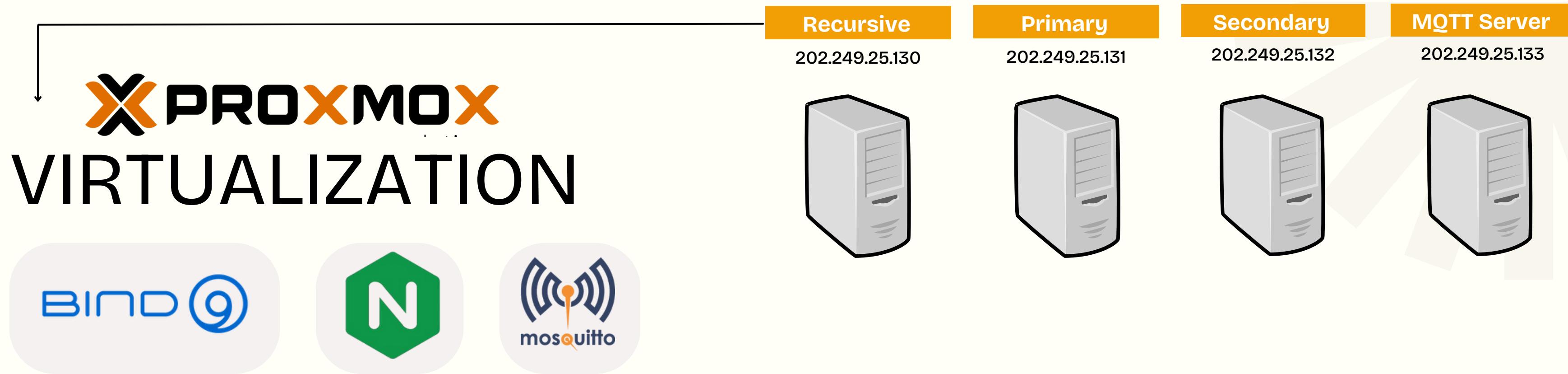
Interface and VLAN interface setup, IP addressing (IPv4 and IPv6), OSPFv2 and OSPFv3 routing implementation , SSH access

ISR-NAT Configuration

Interface and VLAN interface , setup, IP addressing (IPv4 and IPv6), OSPFv2 and OSPFv3, DHCP and NAT configuration. SSH access

Switch n AP Configuration

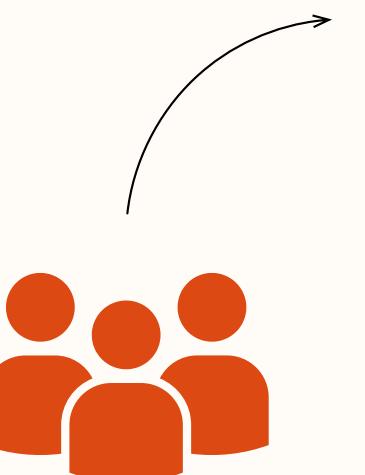
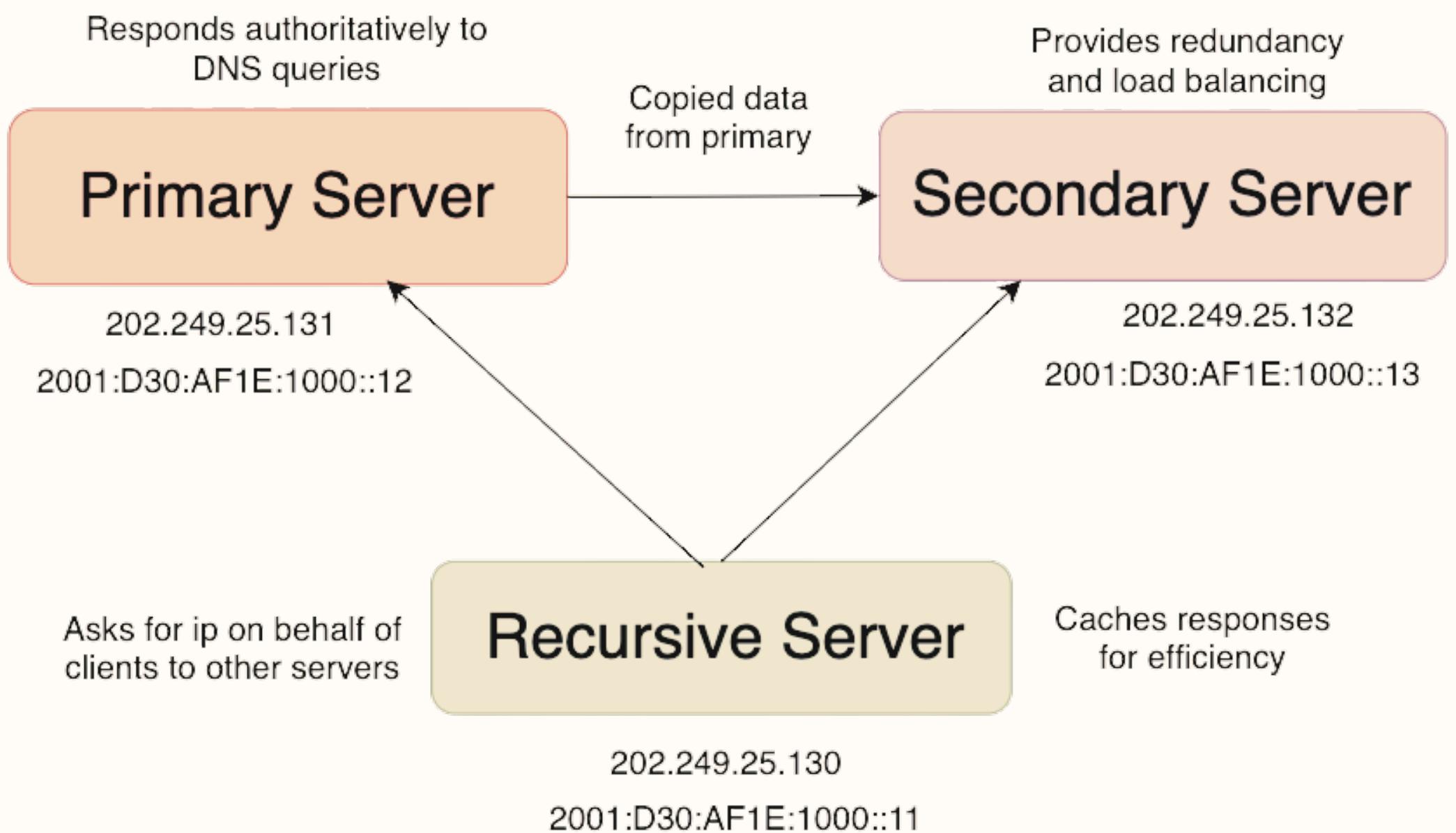
Interface setup, AP configuration



Benefits

- ⌚ Ensures Continuous Flood Alerts – Keeps flood warnings active even if a server fails.
- 💻 Maximizes Limited Hardware Resources – Efficiently runs all network services on fewer machines.
- 🔒 Prevents System-Wide Failures – Isolates services so one failure doesn't disrupt flood alerts.
- 🌐 Remote System Management – Administrators can monitor and fix issues from anywhere.
- 🔧 Rapid Recovery & Backup – Restores services quickly after failures, minimizing downtime for alerts.
- ⚡ Scales with Demand – Dynamically adjusts system resources as more users access the flood alerts.

DNS IMPLEMENTATION



flows-bekasi.com ✓
202.249.25.134 ✗



Why Use Our Own DNS Instead of External Resolvers?

Fast Local Query Resolution

Ensures flood data loads quickly without relying on external internet.

Simplifies Network Administration

Centralized DNS makes managing devices and services easier.

User-Friendly Custom Domains

Allows easy access via simple names like flows-bekasi.com.

Works Without connection to external internet

Ensures internal communications continue even during an internet outage.

Secure & Reliable Operations

Queries stay within the local network, preventing DNS hijacking, spoofing, MITM attacks.



IOT-FLOWS

System Workflow



01

Node Data Collection

Collect environmental data with water level sensor, rainfall sensor, bucket rain gauge

02

Network Transmission

Data is transmitted over VLAN using MQTT broker

03

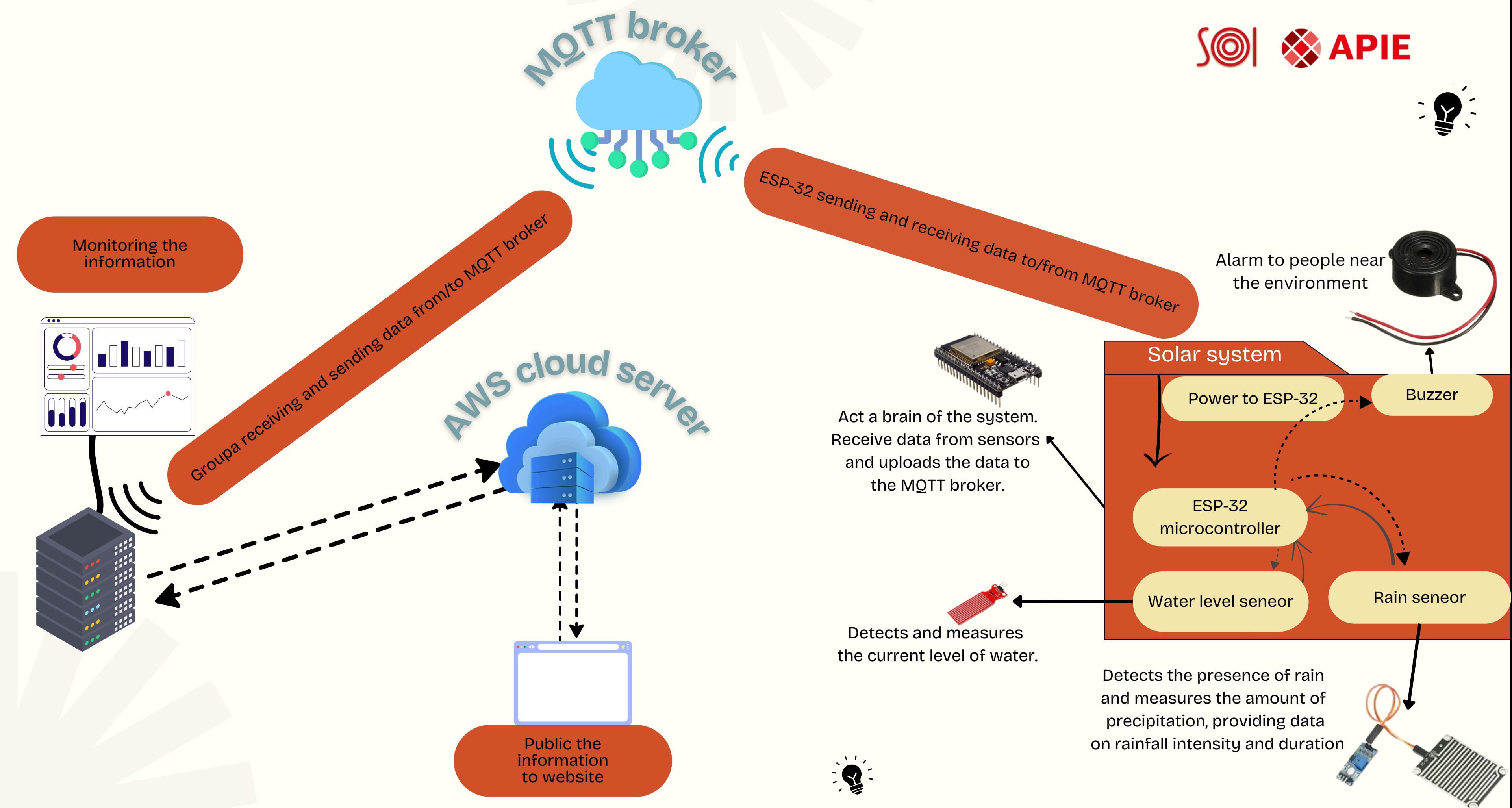
Cloud Processing

AWS EC2 hosts the web server and ML model.
AWS RDS stores data for trend analysis.

04

Early Warning Notification

Notifications are sent via SMS, or website dashboards, and alarm sound.

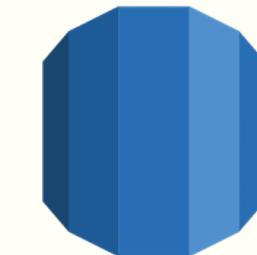


IOT DASHBOARD OPTIMIZATION



Amazon
EC2

EC2



amazon
RDS

RDS

- Scale up/down based on traffic
 - Lambda for efficiency
 - Instance types optimized for ML
 - Supports various OS
 - Many ML Frameworks
- Automated backups
 - Data encryption
 - Real-time data analytics
 - Read replicas and caching
 - Reducing operational overhead

SAFER BEKASI, STRONGER FUTURE!



Alert

Ensure people receive critical information in real-time, allowing them to take immediate action and evacuate if necessary.

Prevention

Minimizes property damage, giving businesses and families time to secure assets and reduce disaster-related losses.

Awareness

Empowers citizens with knowledge about potential risks, fostering a culture of preparedness and resilience in the face of disasters.

Access to Information

24/7 real-time monitoring ensures that accurate disaster updates are always available via website.



Thank you

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