An Empirical Characterization of IFTTT

Ecosystem, Usage, and Performance

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Outline

What is IFTTT

Why is IFTTT

How IFTTT Works

How IFTTT Evolves

How IFTTT Performs

What We can Learn

What is IFTTT

IFTTT

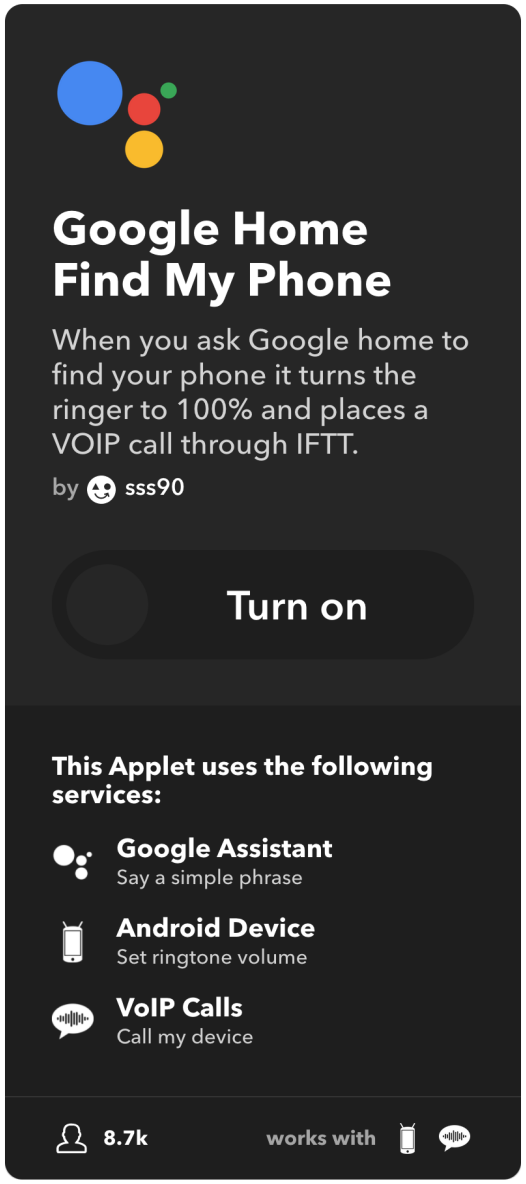
User

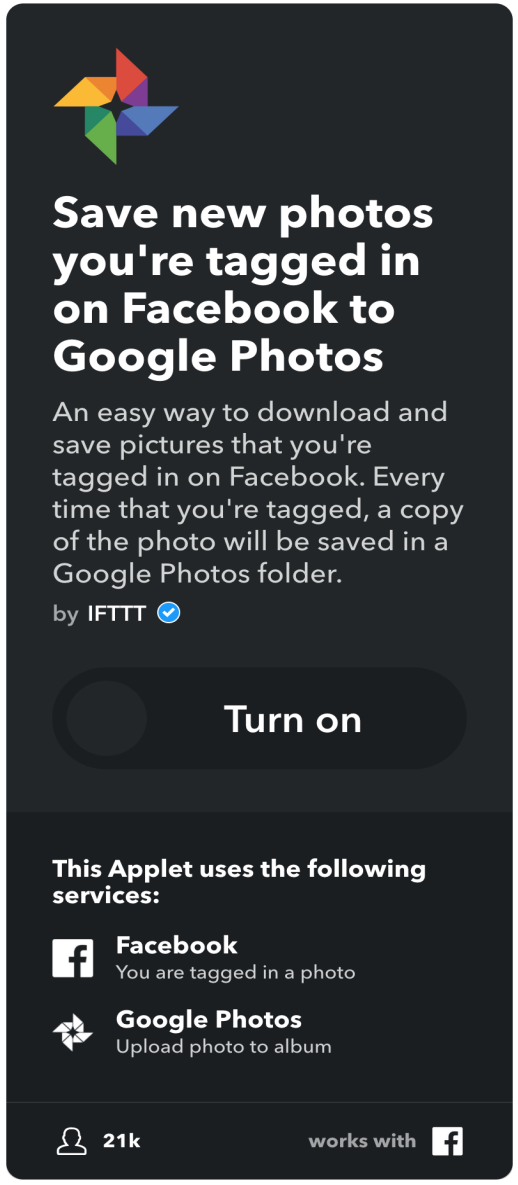
Define, Run and Publish **IF This Then That** Workflows Called **Applets**

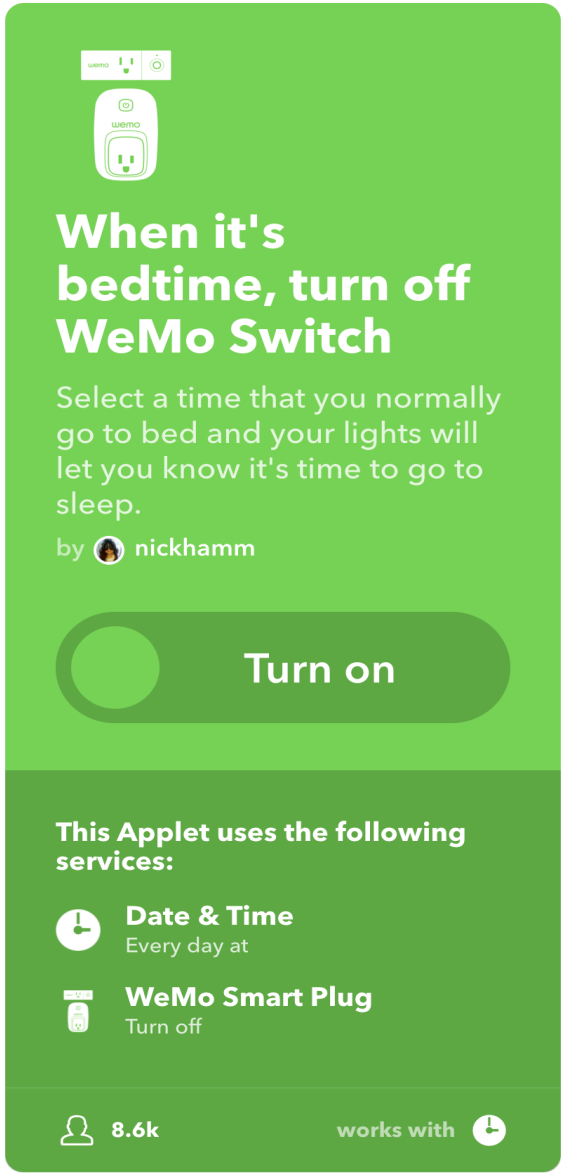
Service Provider

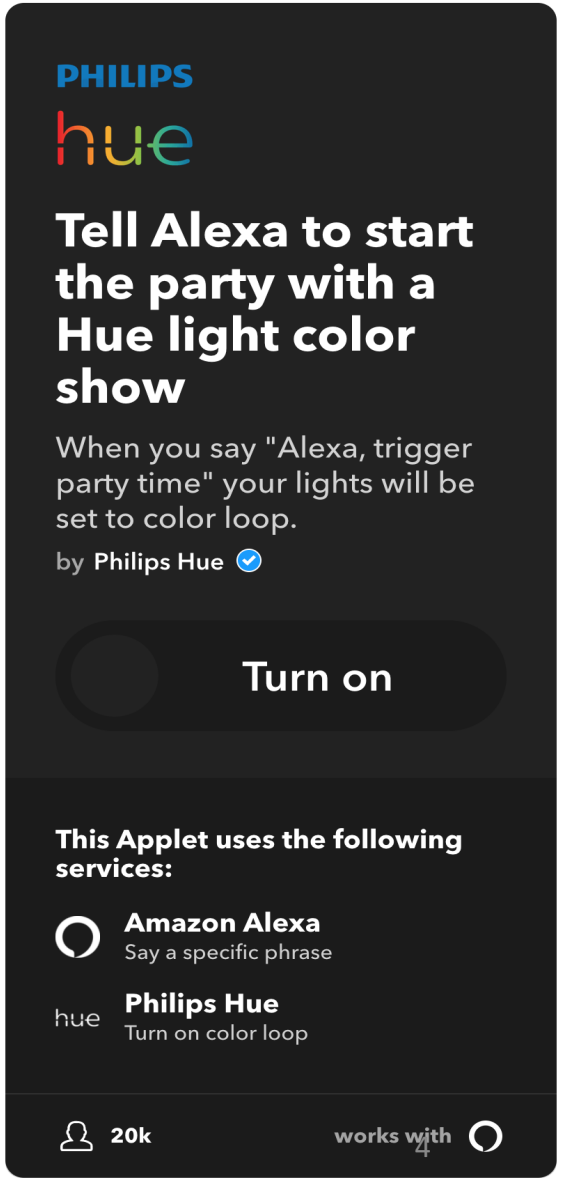
Configure and Publish **Services** Consisting of **Triggers** and **Actions**

What is IFTTT: Applets









Why IFTTT

Diverse

400+ service providers, half are IoT related

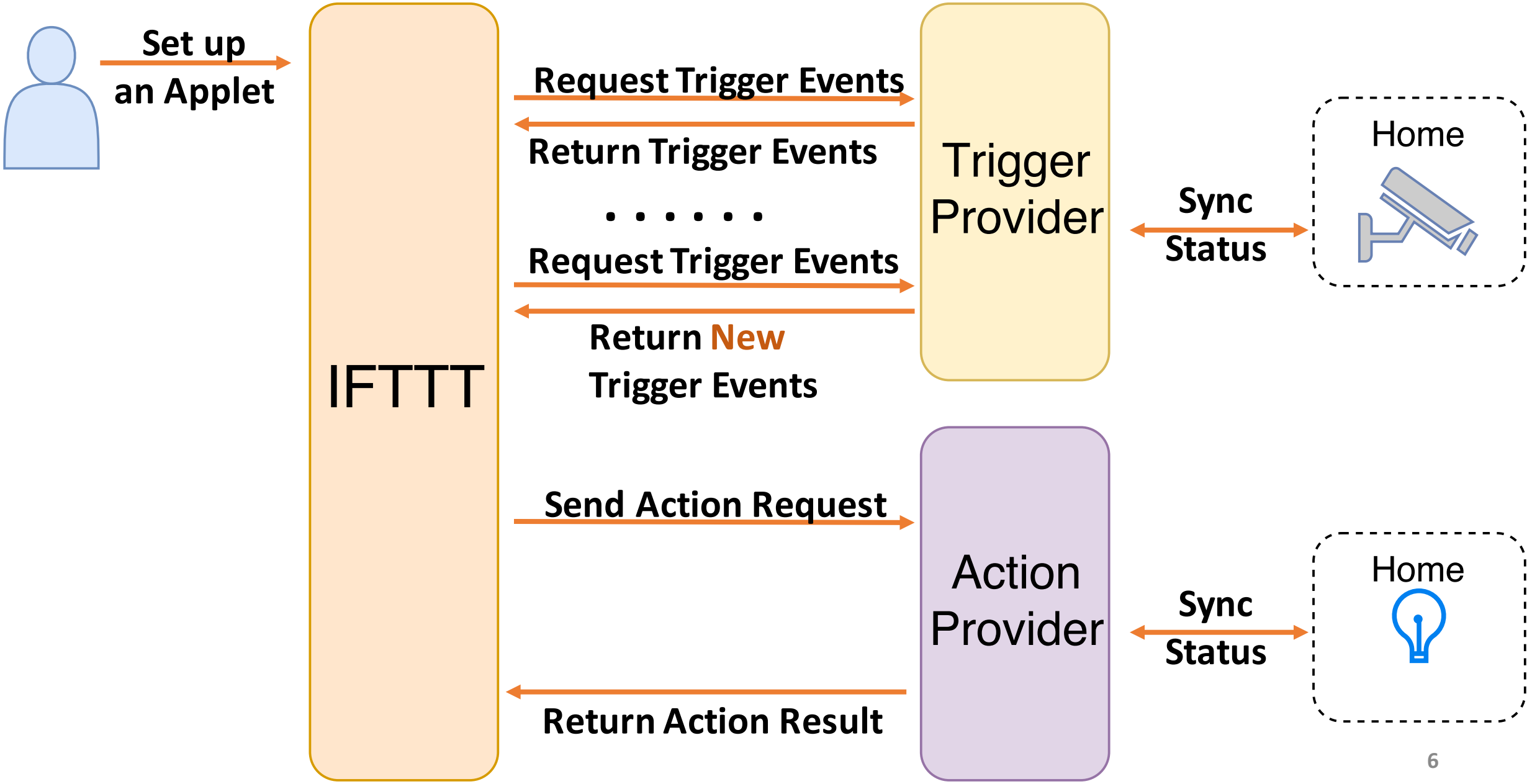
Popular

300K applets, 24-million adoptions

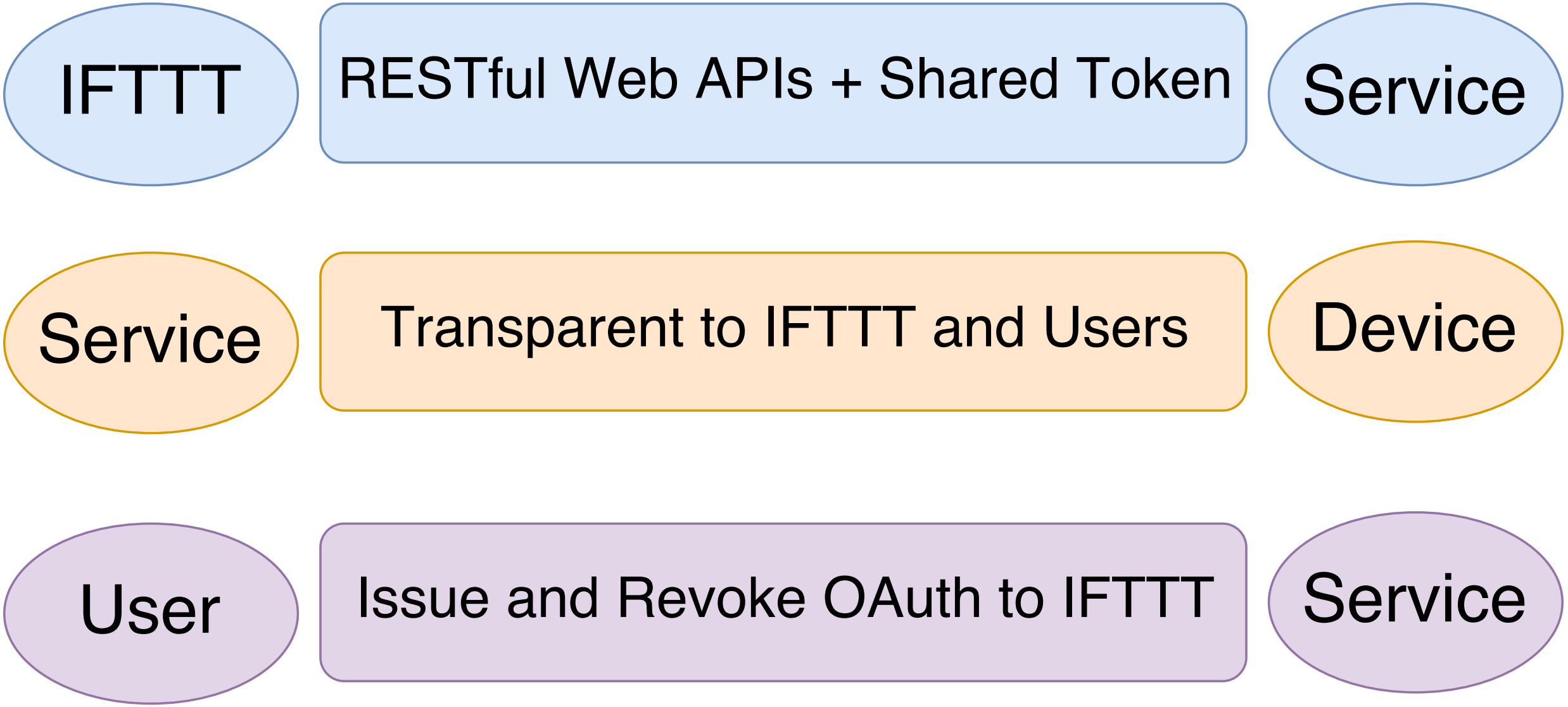
Emerging

How it works, How well it works

How IFTTT Works



How IFTTT Works



How IFTTT Evolves: Methodology

Crawl

We crawled IFTTT every week for its services and applets between Nov 2016 and May 2017

Dataset

Overall, we crawled **200G** data and we have open sourced it on our project website.

Measure

Service categories and distribution, IoT usage, applet properties.

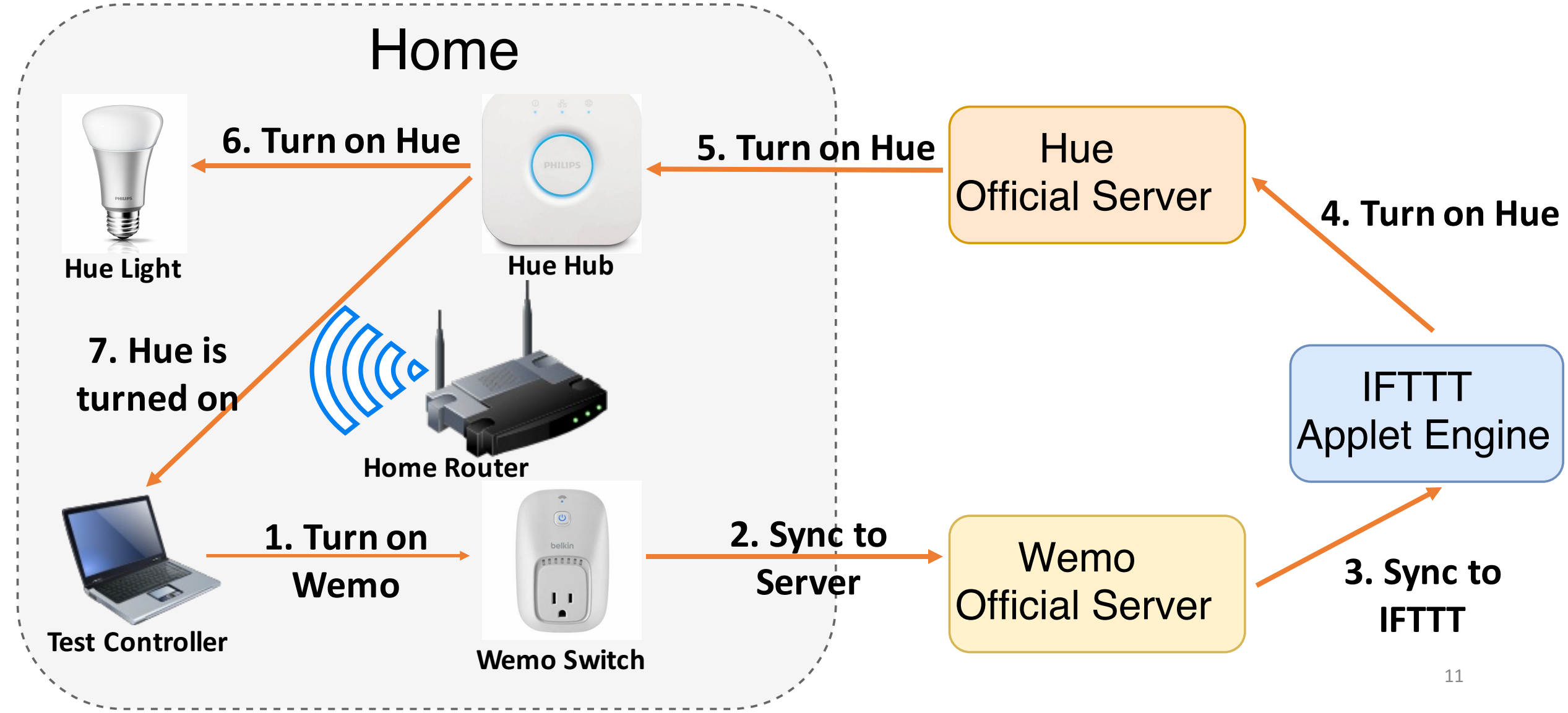
How IFTTT Evolves: Statistics

Aspect	Sep 2015	Apr 2017
Services	220	408
Triggers	768	1490
Actions	368	957
Applets	224K	320K
Applet Contributors	106K	135K
Adoptions	12 millions	24 millions

How IFTTT Performs: Applet Selection

A1	IF	Wemo Switch	is turned on	THEN	Turn on	Hue Light
A2	IF	Wemo Switch	is turned on	THEN	Add line to	Google Spreadsheet
A3	IF	Gmail	gets a email	THEN	Blink	Hue Light
A4	IF	Gmail	gets new attach	THEN	Save to	Google Drive
A5	IF	Amazon Alexa	gets a voice CMD	THEN	Turn off	Hue Light
A6	IF	Amazon Alexa	gets a voice CMD	THEN	Turn on	Wemo Switch
A7	IF	Amazon Alexa	plays a song	THEN	Add line to	Google Spreadsheet

How IFTTT Performs: End2End Latency



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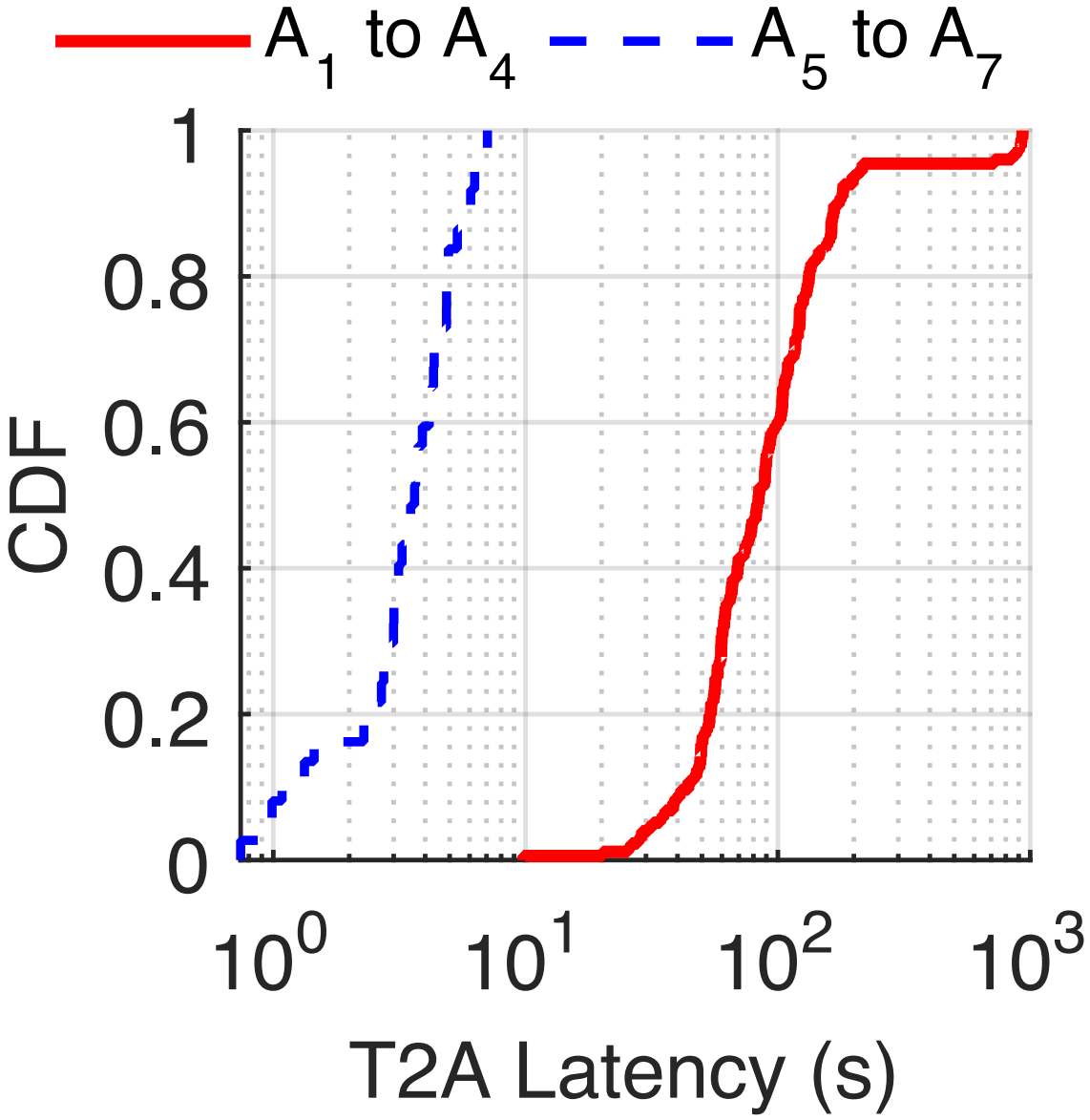


Each applet is tested 50 times at different hours of a 3-day period.

A1-A4 show **large** and **highly variable** latency.
25th: 58s, 50th: 84s, 75th: 122s

A5-A7 involve Amazon Alexa whose applet execution seem to be specially customized.

How IFTTT Performs: Identify Bottlenecks

Who incurs the high latency?

Home

Hue Light

6. Turn on Hue

Hue Hub

5. Turn on Hue

Hue
Official Server

4. Turn on Hue

?

IFTTT
Applet Engine

7. Hue is turned on

Home Router

Test Controller

1. Turn on Wemo

Wemo Switch

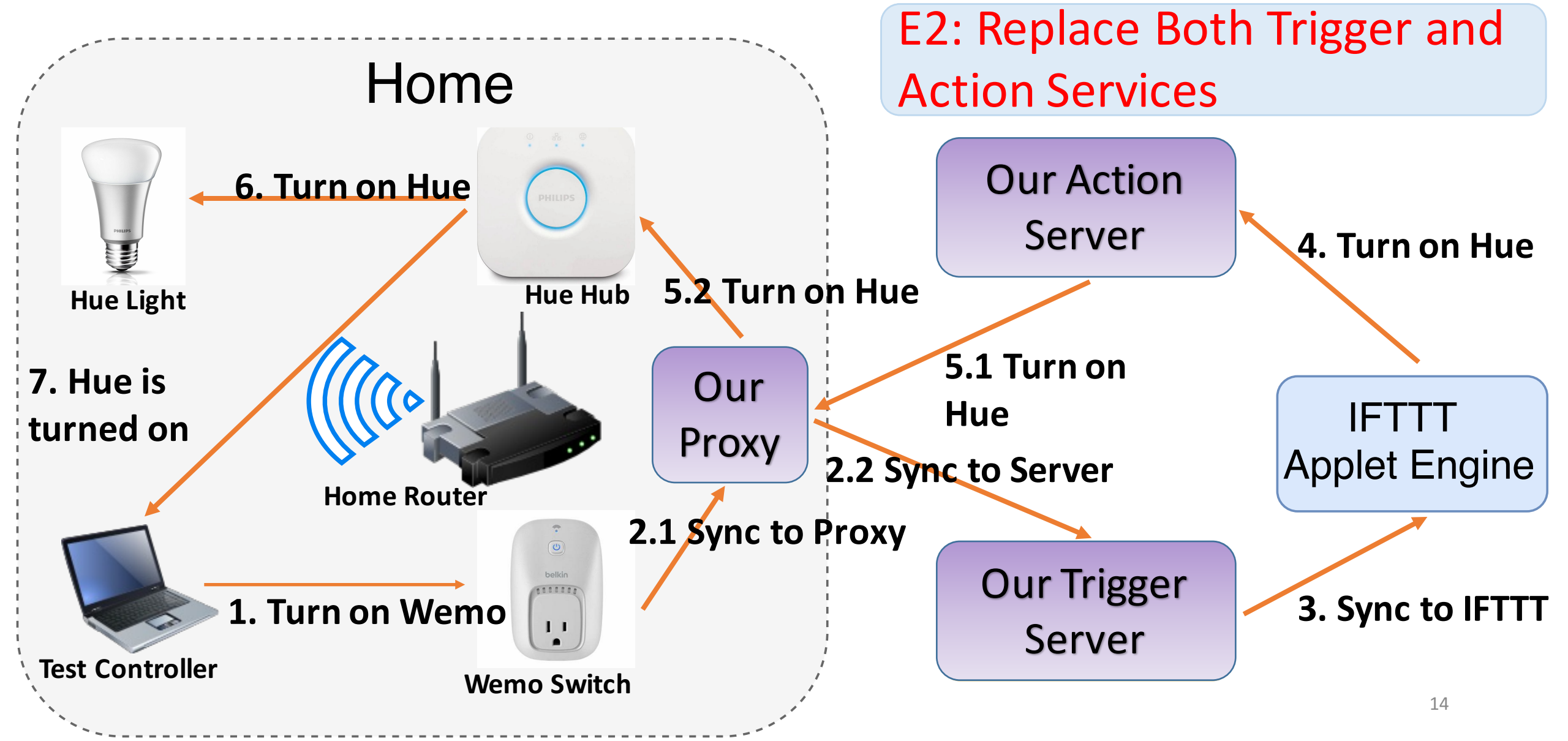
2. Sync to Server

Wemo
Official Server

3. Sync to IFTTT

?

How It Performs: Identify Bottlenecks



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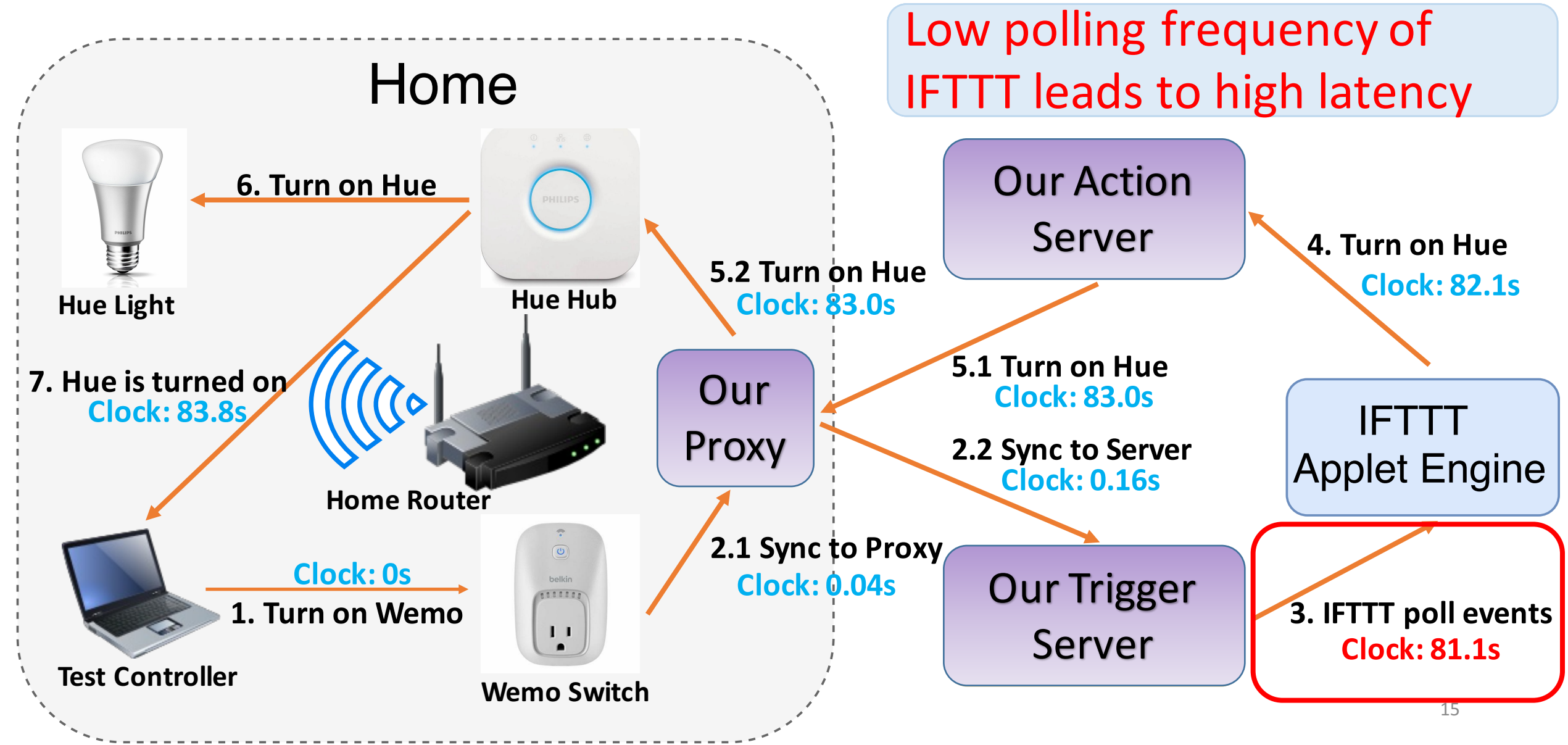


Discussion: Performance

Low Polling

Low polling frequency is not suitable for time-sensitive workflows.

High Polling

High polling frequency will add untenable pressure to the server side.

High Polling

Adoptions: 24 millions, Frequency: 20/min
Polls/Day: 691.2 billions

Discussion: Performance

Push

Intuitively works, requires various service providers to support subscription

Edge Computing

Deploy workflow engines in edging or local environment: security issues

We need a more Efficient and Responsive Solution

Discussion: Security

Least Privilege

Least Privilege rule is broken.
IFTTT requires max privileges for each service.

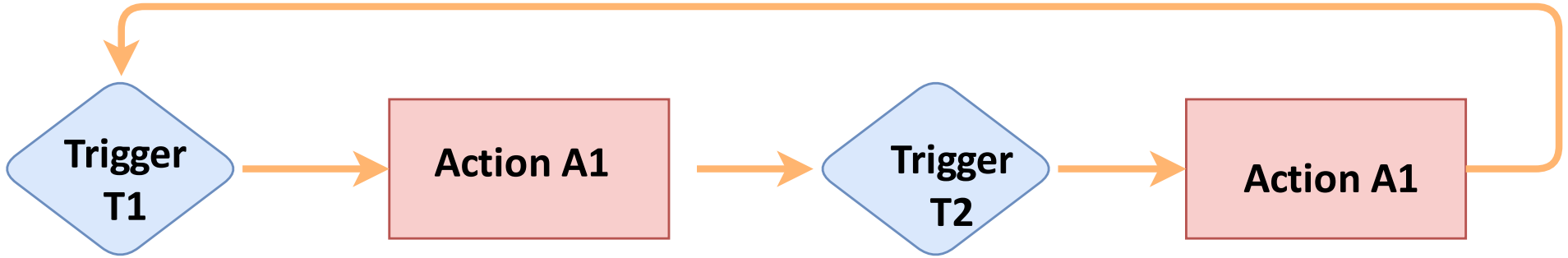
Binding

Privilege authorization is not binding to specific applets and is valid even if no applets require it.

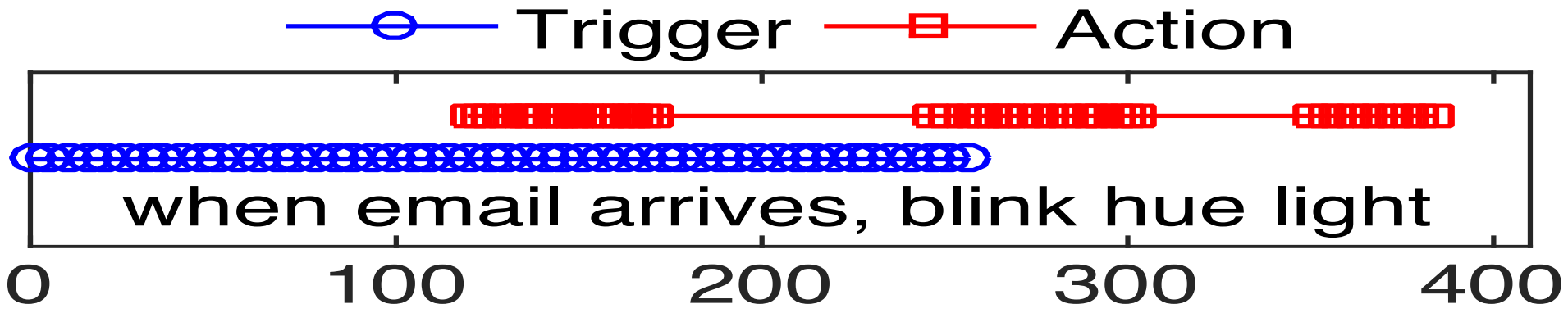
We need a more Secure Solution

Discussion: Intelligence

Infinite Loop



Action Burst



We need a Smarter Solution

Data Release

Applets Services

7 Snapshots, each per month across Nov 2016 to May 2017.

Source Code

Performance testbed, self-implemented IFTTT service, measurement scripts, data crawling scripts.

https://www.cs.indiana.edu/~fengqian/ifttt_measurement/

Q&A

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