IFTTT vs. Zapier: A Comparative Study of Trigger-Action Programming Frameworks

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Abstract

The growing popularity of online services and IoT platforms along with increased developer’s access to devices and services through RESTful APIs is giving rise to a new class of frameworks that support trigger-action programming. These frameworks provide an interface for end-users to bridge different RESTful APIs in a trigger-action model and easily create automated tasks across diverse platforms. Past work has characterized the space of user-created trigger-action combinations in the context of IFTTT, a popular trigger-action framework. In this work, we characterize the space of possible functionality that such frameworks open up to end-users in the context of two major frameworks—IFTTT and Zapier—and discuss results from our comparative analysis of these frameworks. We create a snapshot of 6406 triggers and actions from 1051 channels/apps across these two frameworks and compare the available functions, distribution of channels, and functions shared between them. We examine user’s ability to define their own channels, triggers, and actions; analyze the growth of these frameworks; and discuss future research opportunities in this domain.

1. Introduction

The migration of tools and applications to the cloud, the growth of social networks, and the recent proliferation of Internet of Things (IoT) platforms has taken our devices, services, and data online. Although these systems offer RESTful APIs that enable developers to integrate such services together to provide useful functionality (“If a door is unlocked, then turn off the oven,” “Alexa tell SmartThings to unlock the door,” “Add new posts you like on Instagram to Dropbox”), end-users have no easy way of creating their own integrations. Therefore, we are seeing an emergence of a new class of programming frameworks that offer a simple yet effective trigger-action model that enable end-users to create useful integrations on their own. Users connect triggers (e.g., if door lock is engaged) and actions (e.g., turn off the oven) together to create automated tasks. Given their simplicity and effectiveness, the research community has explored various facets of these models [4, 5, 8].

These frameworks allow users to achieve such automation using the channel abstraction. A channel represents the functions of the online service on the trigger-action framework, and uses the OAuth authorization protocol to securely connect to the online service’s RESTful APIs. Therefore, the channels represent the space of functionality that is possible in these programming frameworks. Prior work has explored the space of user-created trigger-action combinations (or recipes). Ur et al. analyzed the effectiveness of trigger-action programming in smart homes [6]. Ur et al. also created a snapshot of 200,000+ recipes of IFTTT (If-This-Then-That) and characterized the space of user-created recipes [7]. In contrast, we characterize the space of possible functionality in such frameworks by analyzing the properties of their channels. We focus on IFTTT [1] and Zapier [2], two popular trigger-action programming frameworks. IFTTT supports a single trigger and action combination in each task and is focused more on consumer services (e.g., News, social networks) and devices (e.g., Environment control, appliances) with the aim of being easy to use. Zapier [2] on the other hand enables creating more complex tasks and focuses its service on business needs such as project management and marketing automation.

We snapshot 6406 triggers and actions across 1051 channels and analyze the similarities and dissimilarities between channels in the two frameworks. We look at distribution of functions in two frameworks and examine design differences and their implications on how these systems are utilized by end-users. Our results show a trade-off between customizability and usability in these systems.

To promote future research in this domain, we are making our dataset available at https://iotsecurity.eecs.umich.edu/

2. IFTTT vs. Zapier

The goal of both IFTTT and Zapier frameworks is to provide an easy way for non-developers to automate activities across multiple platforms by integrating their functionalities. Hence, these two frameworks share many design characteristics. Figure 1 provides an overview of these frameworks. Both frameworks typically connect to various services and devices by first acquiring an OAuth [3] token. This token allows these frameworks to access the APIs provided by the service and initiate tasks without further user intervention. Each service is represented in these frameworks as a collection of functions. This abstraction is known as a channel in IFTTT and an app in Zapier. For consistency, we will call them channels from this point on.

There are two types of functions in each channel: triggers and actions. A trigger, is an event that occurs in the associated online service. “A file was uploaded to a cloud drive” or “SmartLock was unlocked” are examples of triggers. An action, is an operation (or set of operations) that exists in the API of the online service. Examples of actions include “turning on or off a connected oven” or “sending an SMS.”
Both frameworks allow users to combine triggers and actions to define various tasks. These tasks are known as Recipes in IFTTT and Zaps in Zapier. IFTTT limits each task to a single trigger and action. This provides a simplistic model that is easy to follow for the end-user. Zapier on the other hand allows multiple actions to be tied to a single trigger. This allows Zapier to support more complex operations such as searches and modification of existing data. Zapier also provides a series of filters that provide additional conditional (and/or) control over trigger components (e.g., if “receiving an email” acts as a trigger, filters could include “subject contains X” and/or “is from Y”). This allows for much richer customizability but can potentially overwhelm the typical user.

There are other characteristics that make the systems different from each other. IFTTT provides a social component for its tasks, which allows users to share their recipes with each other and provides statistics on how many people use a recipe. These user interactions have been studied by Ur et al. [7]. It also provides a mobile application for both Android and iOS platforms that allows mobile services to be added as channels. Zapier on the other hand provides developers with the capability to define their own custom channels. We will describe our data collection and findings in the next section and then discuss the implications of these design differences.

3. Methodology

We created a snapshot of IFTTT and Zapier channels on September 6th, 2016. We first analyzed the network traces of the communication between the IFTTT and Zapier front-ends and their respective back-ends. This helped us identify RESTful endpoints that enabled downloading channel details. We coupled this with HTML screen scraping to create our dataset of 350 IFTTT channels and 701 Zapier channels. Our dataset is comprehensive—it contains information about channel name, the set of triggers and actions including human-readable descriptions, and the set of input arguments for each trigger and action. We provide an example of channel data structure for IFTTT and Zapier along with the dataset at our website.

4. Findings

4.1 Rapid growth

Our dataset, collected on September 6th, 2016, includes 1051 channels and 6406 triggers and actions in total. Table 1 compares our collected dataset with a previous snapshot of IFTTT collected on July 24th, 2016 by our group and also IFTTT snapshots collected by Ur et al. [6,7]. In terms of sheer numbers, Zapier offers more than twice the number of channels, but more than three times the number of functions. So channels in IFTTT are on average sparser than Zapier. Also based on trend data, we see a linear increase in number of channels, triggers and actions through time.

4.2 Distribution of Triggers & Actions

Our data shows that triggers and actions are not evenly distributed among channels in either of the frameworks. Figure 2 presents CDF of triggers and actions in IFTTT and Zapier. More than 11% of triggers and actions in IFTTT are limited to the top 10 channels and the first 70 channels account for 51% of triggers and 58% of actions. Similarly in Zapier, More than 10% of triggers and actions are in the top 20 channels. There are also many channels in both systems with only a single trigger or action.

4.3 Difference in Target Audience

Based on types of the channels available, IFTTT and Zapier serve a widely different target audience. Table 2 presents the top 20 categories and number of channels associated with them in IFTTT and Zapier. While IFTTT focuses on home-user functions such as smart home, IOT, and social networking; Zapier focuses on business func-

Table 1: Numbers of channels, channels that include a trigger, channels that include an action, triggers, and actions in IFTTT and Zapier. We also include data from our snapshot of IFTTT on July, 2016 and two snapshots provided by Ur et al. for comparison. IFTTT data shows a linear increase in number of channels, triggers and actions through time.
Figure 2: CDF of Zapier and IFTTT triggers and actions. 50% of channels in both IFTTT and Zapier hold more than 80% of triggers and actions.

Table 2: Top 20 channel categories in Zapier and IFTTT. Zapier focuses more on business-oriented channels, while IFTTT focuses on consumer-oriented channels and IoT.

| Zapier Count | IFTTT Count |
|--------------|-------------|
| Social Media | 5           |
| Business Tools | 7         |
| Bookmarks    | 3           |
| Task Management | 6       |
| Time Tracking | 3           |
| Social Networks | 5        |
| Devices      | 3           |
| Communication | 4           |
| Team Chat    | 3           |
| Cloud Storage | 3          |

Table 3: Top 5 shared channel categories in Zapier and IFTTT. Common channels typically fall into categories used by both home and business users.

4.4 Shared Channels

Even though the two frameworks seem to serve different audiences, there were still 47 channels shared among them. Table 3 presents the top 5 categories in each framework that the shared channels fall under. These categories typically fall within domains that are shared between home and business user. We also computed lexical matches between title of triggers and actions in both services. Our results showed 103 common functions shared in common channels between the two services. This accounts for 45% and 24% of functions existing for those channels in IFTTT and Zapier, respectively.

5. Discussion

To our knowledge, we present the first large-scale exploration of the space of functionality that trigger-action programming frameworks provide. We find that beyond targeting different application areas (e.g., physical devices vs. business productivity), the two frameworks that we studied (IFTTT and Zapier) also differ in the level of customization they offer end-users during recipe creation. However, we also find that IFTTT and Zapier are capable of interoperating with each other, leading to the possibility of finding different balances between customizability, application area, and usability depending on end-user service composition scenarios.

5.1 Customizability vs. Ease-of-Use

Although IFTTT channels have on average 4 triggers and 2 actions per channel, it only supports a single trigger and action per recipe. In contrast, Zapier features 6 triggers and 3 actions on average per channel and supports multiple triggers and actions per zap involving AND/OR combination operators. Therefore, it would appear that IFTTT is easier to use in comparison to Zapier since the end-user has lesser cognitive load while creating trigger-action combinations. However, Ur et al. showed that often users would require multiple triggers and actions in a single recipe [6]. Therefore, for more advanced users, IFTTT could readily support multiple triggers and actions since its channels already feature multiple operations, as our analysis shows.

2http://www.nltk.org/
5.2 IFTTT Maker and Zapier Webhooks

IFTTT and Zapier feature one-size-fits-all channels that can be used to make and receive HTTP web requests from arbitrary external platforms. Both IFTTT and Zapier support the standard set of HTTP verbs, while IFTTT currently supports three content-types (json, form-urlencoded, text) and Zapier supports fully custom requests. We observe that these mechanisms can be used to add additional functionality to the frameworks, although in a non-uniform way. That is, users will have their own names and semantics for the operations they enable using the Maker and Webhooks mechanisms. Finally, maker and webhooks are private to the user who created them.

5.3 Developer-friendliness

IFTTT currently offers an invite-only program to extend it with new channels. In contrast, Zapier offers a developer mode where channels can be created directly by users. We expect that such functionality is exercised by the advanced user. Furthermore, we note that Zapier developer mode can be used to create cyber-physical channels that are not present by default, but this would of course be relatively inaccessible to the casual user since it requires understanding RESTful APIs and authorization protocols such as OAuth.

5.4 Open Questions

We discuss a few open questions based on our analysis of channels in IFTTT and Zapier.

Finding a balance between expressivity and usability: We observed two ends of the spectrum—IFTTT offers only a single trigger and action per recipe and Zapier offers multiple. Past work has shown that multiple triggers and actions are desirable in certain settings [6] implying that Zapier offers the better suited framework. Therefore, it could potentially be used as a tool for user studies to determine a balance between expressivity and usability.

End-user channel development: Although Zapier offers a developer-oriented way of adding new channels to the framework, since such frameworks are ultimately targeted towards the end-user, more research is needed to determine how to better enable end-users who are not developers to build their own channels. This would require designing point-and-click interfaces that are simple but powerful enough to achieve complex integrations that span the use of authorization protocols like OAuth and the use of RESTful APIs.

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