Introduction to Software-bots: Slackbots

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May 17, 2022

1 Introduction

Software-bot is not entirely new technology and some of the software-bots' history can trace back to 1988 [10]. Unfortunately it is not so rare that the software-bot is referred to as something negative due to its usage for spam, malware and so on by malicious users. However when bots are used for constructive purposes it would help improve productivity and reduce cost of project for users. It is quite important to study both positive and negative aspects of bots, but in this essay it is focused on the positive side. DevOps is an highly effective approach in software development which enables faster and good development cycle. Is it possible to improve the efficiency in DevOps by adopting the use of software-bots in it? What is the software-bots and what types of them are currently available? This essay is aimed to introduce basic information about software-bots and some of its related areas, as well as further focusing on a specific bot namely Slackbots which are used in a messaging app Slack. The topic of Slackbots is going to be discussed in a context of benefits for DevOps.

2 Background

2.1 Software-bots

Bots are short for "Robots" and it can be used in physical robot as well as in software [9]. There are many types of software-bots, but one of the bots people often see in their lives might be for example chatbots. Chatbots were in earliest days described as programs which passes turing test and can fool humans into believing that they are interacting with real humans than a program. But nowadays purpose of the use of bots are more focused on automating tedious tasks rather than imitating perfect humans [8]. Software-bots are used for automating tasks by running code [6], and today half of the entire internet traffic is estimated to be made by the automated tasks of bots e.g., customer services, simulation of human communication on social networks, helping companies search online for content and assisting with search engine optimization [11].

2.2 DevOps

DevOps is an integration of two different parts, namely development and operations by using automated development, deployment, and infrastructure monitoring [7]. The integration of the development and operations enables faster delivery cycle. And not only that, the adaption of DevOps provides some other benefits for example, improved collaboration, early bug detection and fixing and improved productivity [4]. However, adaption of DevOps is not always successful. The factors hinder DevOps adoption are due to human aspects such as lack of communication and resistance to change, and technical aspects such as the complexity of development and production environments [14].

2.3 Slack

Slack is a collaboration platform/messaging app which enables users to communicate quickly and efficiently in their team. Users can work in dedicated places called channels in which specific people and information is brought together. Everyone in the same channel can access the shared information and that helps the team to be organized and enables quick decision making [20].
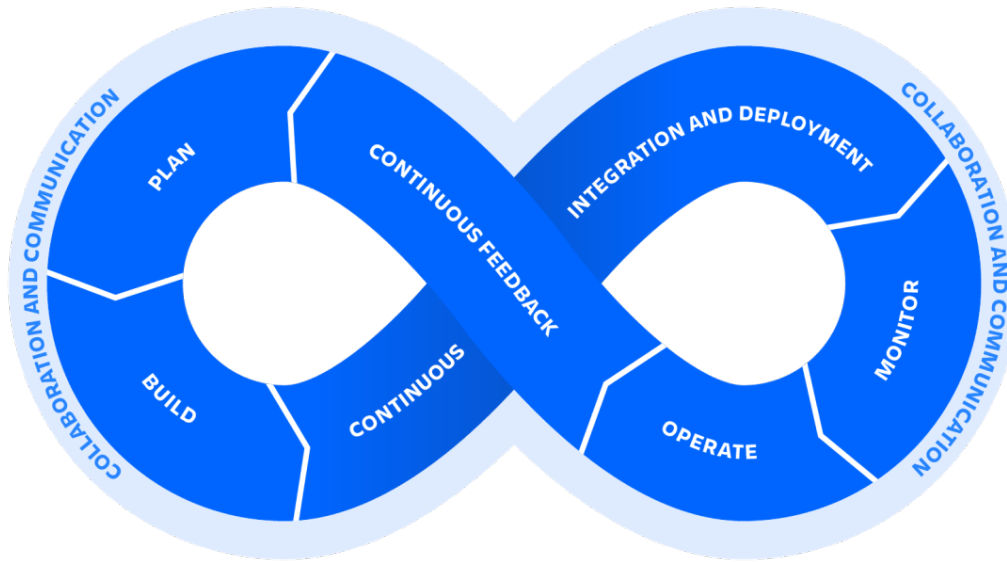
Figure 1: The DevOps lifecycle [2].

2.4 Slackbots

Slackbot is a software-bot used in Slack and it can access same range of APIs as slack app can. The difference between the bot and app is that the bot has more personality such as a name, and the users can interact with the bots. Bots can do for example sending DMs, being able to be mentioned by users, posting messages or upload files, and it can be invited to channels [19].

3 Software-bots in DevOps and ChatOps

3.1 Adaption of bots

Nowadays messaging platforms such as Slack and Facebook Messenger are widely adopted worldwide, and that is one of the causes that bots are rapidly becoming adapted as interfaces for software services in practice. Other causes are the advancement of natural-language processing, and widespread presence of big data, as well as machine-learning algorithms for analyzing data across many domains. Here bots are used as convenient UI for interacting with those algorithms and data for the developers [12].

A CI/CD pipeline is consists of several stages, and bots can be implemented in them. An example of what tool can be applied to phases in the DevOps cycle is listed below:

- Proactive planning – JIRA

- Requirements management – JIRA

- Continuous integration – Jenkins

- Continuous deployment – Ansible, Chef

- Continuous monitoring – Nagios, Grafana, Splunk

- Continuous feedback – JIRA [16]

As it can be seen in the example list above, by using bots in different combination of tools they can cover wide range of the phases in DevOps cycle.

3.2 ChatOps

There is a collaboration model called ChatOps. This model formulates communication-driven environment, and it help connect people, tools, process, and automation and enables having a transparent workflow [3]. The term ChatOps was first created by GitHub to handle DevOps by using a bot called Hubot, and since then other organizations also started to adapt the ChatOps along with DevOps [17].

ChatOps' fundamental components are Chat Application, Operational Tools, and Chatbots [17]. Among those, the most relevant components to this essay are Chat Application and Chatbots. Some popular chat applications would be Slack, Microsoft Teams, Google chat and so on. And those applications are further going to be integrated with bots.

As it was mentioned, Chatbot is one of the core components for ChatOps. Chatbots act as a bridge between chat application and operational tools (tools for such as version control, knowledge management, incident management, change management, etc [17]). The bots refer to information by exchanging messages through the chat application while integrating with the operational tool, and bots can also accept commands from chat application and run it on operational tool [17].

4 Classification of bots

4.1 Bot types examples

Chatbot is mentioned as a type of software-bots, and it was also mentioned that there are many other types too. Some web articles introduce different types of bots, but those types differed from author to author. For example, one website listed up some types namely, Spider Bots, Scraper Bots, Spam Bots, Social Media Bots, Download Bots, Ticketing Bots and Malicious and Non Malicious Bot Activity [15], and another website listed up Chatbots, Crawlers, Transactional bots, Informational bots, Entertainment bots: Art bots, Game bots and so on [5].

4.2 Characterization of bots

Are there any better ways to characterize those bots depending on their features? Lebeuf et al. proposed three ways of characterizing bots and provided some examples. The first way is doing that thorough bots' interaction model. For example, some bots interact with users through specific commands in a command-line interface, and the other bots might parse natural language through text or speech [12].

And the second way is using the bots' intelligence according to three aspects namely, Adaption, Reasoning and Autonomy. Some bots are aware of context and be able to change and adopt its way of interaction with users. Such bots can be characterized using this Adaption aspect. And in Reasoning aspect, how the bots reason their action are considered. For example whether they are just following simple logic rules, or some advanced AI-techniques are used in them. And finally in Autonomy aspect, it is about how much freedom do the bots have for their behaviour is looked. some bots might require some user input for their behaviour, other bots might be completely autonomous, or somewhere in between [12].

And the third way of the bots characterization is according to their purposes. Lebeuf et al. listed up 5 different types of bots, namely Generalist bots, Transactional bots, Informational bots, Productivity bots, Collaboration bots. An example of Generalist bots is Siri which is used for supporting users for wide range of tasks. Transactional bots are used for automated transaction, and Informational bots are bots which gathers information for example stocks or weather. Productivity bots are used for improving productivity of person or team by automating tedious tasks. And collaboration bots are used for helping communication, coordination, and collaboration [12].

5 Building a Slackbot

5.1 What Slackbots can do

It is impossible to list up all the things Slackbots can do, but I introduce some of the useful features in this section. One of the things a Slackbot can do is automated reply. This is the easiest function which Slackbot detects specific phrases and reply automatically to it. This feature can be for instance

used for answering frequently asked questions or something important but easily forgotten, and users are no need to carefully watch for the phrases in question in channels. Building this replay bot is easily done in Slack's settings page, but the bot's functionality is limited to replying with same phrases the user specified. One of the ways to add more customizability to this bot is using a tool called Zapier. Zapier is a tool which connects users' work apps and enables automated tasks [13]. By using a tool called Formatter in Zapier, users can for instance, format their text, calculate values, choose random values from a list, and so on [13].

The combination of Slackbot and Zapier also makes it easier to create a Notification bot. For example if a user wants to receive a notification on Slack when a new task is added on other collaboration tool such as Trello, Slackbot can receive and show the notification through Zapier [13].

One of the most powerful and advanced bots in Slack would be Slash command bot. Slash commands are the commands which invoke app by typing commands in message box [1]. Slash command bots require more configuration than Reply and Notification bot, but it can do wide variety of things, for example searching for a person's contact information such as email address and phone number.

Another useful thing a Slackbot can do is making the channel messages more interactive by for example adding buttons or menus to the messages as interactive components [18]. Using this buttons and menus, users can easily send their choice/thought by just clicking the button or selecting the option from the menu. Those interactive components help quick and clear decision making in a team.

5.2 Benefits of using Slackbots in DevOps

In the previous subsection some of the Slackbots' functionalities were introduced. So how those functionalities can be beneficial in DevOps? Slackbots' benefits can be boiled down to saving time and effort in teams by automating small tasks. For instance, it was mentioned that the Reply bots can automatically answer to the specific phrases. Answering question manually could be a tedious and time consuming task, and waiting for the reply can take some time and it can hinder the other tasks while waiting. It is difficult to cover all the possible cases with the Reply bots, but it would most likely ease the issues with the time consuming manual reply which could disturb the sound development cycle in DevOps.

Notification/Reminder bot would reduce human errors, and members in development teams would be able to focus on the main tasks. Missing important events, issues, etc can easily happen without any notification system or reminder and it can lead to serious problems. The configuration for those bots are relatively easy, and would effectively prevent such problems.

Collaboration and speed are some of the key benefits in DevOps. The usage of Slackbots can boost these benefits. As previously mentioned, bots can add interactive components to the messages in channels, and that would make the quality of communications better and help faster decision making. This will lead to better collaboration and help the fast product release, as well as maintaining product's good quality in DevOps.

6 Reflection and Conclusion

In this essay an overview of the software-bots and its related areas, as well as the benefits of the Slackbots were presented. Software-bots are not limited in some specific areas, rather their types are widely varied. It seems that narrowly defining bots is not something useful since there are already too many types. Software-bots are so useful that it occupies large amount of the internet traffic, and the usage of bots are going to be increased in the future. It might going to be more important to consider how effectively one can adopt the bots in software-development depending on the situations, for instance considering correct place and time.

ChatOps was briefly described as a commnication-driven collaboration model which can be adopted along with DevOps. In can be said that the ChatOps is closely related to bots and DevOps, thus when we consider applying bots into DevOps for better performance, it might be inevitable to look deeply into ChatOps.

The conclusion of this essay is that the usage of Slackbots will save time and effort by the automation of small tasks, and it can also help improved communication as well as faster decision making, thus it is beneficial to be implemented in DevOps.

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