Anders Martoja

Report for Distributed Systems Spring 2019 seminar on "Executive summary of automation & operations"

Supervisor: Ilja Livenson, MSc

Tartu 2019
Abstract:
Automation is something that several view as a threat to the mankind’s current way of life. One could argue that just because automation poses a threat to some jobs, it, through the creation of new technologies, which automation supports, opens up new jobs. The author of this report is of a belief that repetitive and mundane tasks if possible should be automated.

The work at hand is potentially in some form part of the author’s upcoming master thesis. The work has three main focuses. Firstly, to classify operation specialist’s and define their function in a company. Secondly, list the pros and cons of having a human workforce in an Information and Communication Technology company and the pros and cons of automation.
## Contents

1 Introduction 4

2 Roles 5

3 Pros and cons of human workforce and automation 7
   3.1 Human workforce 7
      3.1.1 Pros 7
      3.1.2 Cons 7
   3.2 Automation 7
      3.2.1 Pros 7
      3.2.2 Cons 8

4 Future work 8

5 Conclusion 8

References 9
1 Introduction

This report uses terms operations (Ops) professional e.g. SysmOps, NetOps, CloudOps and administrator (admin) e.g. System Administrator, Network Administrator, Cloud Administrator, interchangeably.[10]

The operations (Ops) involved in keeping a company’s ICT infrastructure functioning is a crucial part of any organization. Ops embodies an extensive range of tasks and is continually changing. Cloud is taking over infrastructure and physical labor is dwindling. The focal point is shifting to tasks which require relatively new set of skills e.g. automation, virtualization, configuration.[10]

From the human standpoint, human capital comprises of the wealth of knowledge and personal attributes, which are express themselves in the ability to yield economic value from labor. Human capital in the information and communication technology (ICT) sector is crucial for digital innovation and novel digital enabled services. It could be considered essential part of modern competitive economies. Automation and digitalization can be utilized to develop new business endeavours. These developments have mostly driven efficiency and productivity increase in the work places. Automation particularly has been a cause for job loss, which has brought a wave of retraining the current workforce. [6]

This leads into a problem regarding human workforce. According to [4] "the gap between the demand and supply of ICT specialists will grow from 373 000 in 2005 to about 500 000 by 2020." While the total employment of ICT specialists has steadily increased over the last decade, companies are experiencing hardships in finding the right ICT personnel to aid them. In 2016 European commission launched Digital Skills and Jobs Coalition which aims to improve the skills of ICT personnel and general public through promoting cooperation between education and industry. [4]

As companies mature and flourish increasingly larger numbers of ICT specialists are needed, requirements for Ops are also changing. Since there is no one size fits all role for operations, it is usually observed as a field with many roles heavily overlapping with each other. In the following section, the author categorized the roles with the help of [7].

The report is divided up into four part. In section two the classification and function description of operations specialist is covered. Third section presents a lists of pros and cons of human workforce and automation. Fourthly, future work is discussed as this report serves as a piece in a bigger upcoming work. Finally, conclusion covers everything that has been done.
2 Roles

In this section the author has roughly categorized the roles of professionals involved in operations of IT systems. The categorization is based on [7]. The following chapter does not try to carve these roles in stone, rather give an overview of specializations in the field. Additionally, many of the categories actually overlap in skills. In section X, the thesis covers a meager number of IT companies and how those roles are defined in their organization. Figure 1, at the end of this section gives an visual overview how these roles overlap and tie together in a company.

- System administrator/ SysOps - SysOps deals with managing computers, networks and software on the behalf of others - colleagues, employers, clients.[11] Since system administrator is a general term and covers a wide spectrum of specializations an organization usually splits up the different jobs and assigns them different titles.

- Database administrator / DBAs - Professionals who specialize in setting up, maintaining and working with databases are called DBAs. The work entails managing database schemas, performing upgrades, configuration for best performance and working with users to perform optimal queries. Database administrator usually know more than one query language and feel comfortable with relational databases and nonrelational ones. [7]

- Site reliability engineer / SRE - SREs focus on three domains: engineering, reliability and services. Engineering comprises of developing large distributed computer systems, writing additional software for said systems, applying existing solutions. Reliability expresses itself finding new ways to make systems more scalable, reliably and efficient up to a certain point - "reliable enough" point. SREs also handle services from the standpoint keeping which ever service that is assigned to them running. [9]

- Security operations engineer / SecOps - Operations professional who specialize in the overall security of the system. They install, manage and monitor outputs of applications and tools which are used for vulnerability testing and attacks against the system. They might also provide security training for people as to minimize the human error in the security process. [7]

- Network administrator / NetOps - Ops professionals who install, configure, manage and maintain networks. Network administrators are most likely to be found in organizations with actual data center hardware. Companies that rely on software defined networking or cloud provided networking might not actually require a dedicated NetOps specialist due to general APIs and cloud side tech support. [7]
- DevOps - Professionals who specialize in development and ops simultaneously. DevOps’s integrate the best practices of ops into the system in development to make the subsequent maintenance easier for ops and thus improve quality of service. Additionally, the find and optimize inefficient processes. [7]

- Architect - Professionals who possess thorough understanding of more than one area, this knowledge is used for planning out, implementing and testing holistic systems.[7]

Figure 1. Different ops and their respective areas of responsibility visualized
3 Pros and cons of human workforce and automation

Current section focuses on listing the pros and cons of having human workforce, later the same is done for automation. Lists were the preferred way to present this section, due to them being short, concise and to the point. The sources for these lists come mostly from european union statistical research reports/articles.

3.1 Human workforce

3.1.1 Pros

• Geographical mobility
• Comprehensive skill-set [5] [3]
• Handle the unexpected [8]
• Problem solving creativity & improvisation [3] [8]

3.1.2 Cons

• Constant training[5]
• Retraining[3]
• High costs[3]
• Human error
• Need for breaks

3.2 Automation

3.2.1 Pros

• Eliminate repetitive tasks [8]
• Ease labor shortage[5]
• Increased efficiency[6]
• Improved quality [6]
3.2.2 **Cons**

- Can not handle unexpected [8]
- Less versatile [8]
- Increase unemployment [6]
- Redistribution of skills [8]
- Unexpected bottlenecks [8]

4 **Future work**

This report resembles executive overview of Operations and automation with an parallel focus on pros and cons of them. This report’s will be integrated into the author’s master thesis.

The author has prepared a short, concise and to the point emails to get in touch with a list of potential companies to be interviewed. The final format of the interviews depends on the company and whether or not they are even willing to discuss Ops’s classifications in respective company. The author has planned to offer a alternative to interviewing someone from the company in the form of a Google Form.

This report will be used as an introduction for the authors thesis, in which the author takes on the University of Tartu High Performance Compting Center’s[1] (later HPC Center) everyday repitive tasks. StackStorm[2] is the platform that is to be tested against the university’s HPC center, it was chosen by the supervisor as a platform with a solid user base and with quite a few big clients.

5 **Conclusion**

The report gave a brief but rather specific overview of the ICT sector problems. Additionally, operations specialists, their classification and functions were discussed in the third section. Section four provided a statistics backed pros and cons of human work force and automation.

**References**


