APIK COMPUTERS

Total Cost of Ownership (TCO) Analysis

ANALYSIS REPORT FOR EVALUATING TCO OF ON-PREMISES AND CLOUD ENVIRONMENT

PIYUSH NARKHEDE
x17151538

UTILITY COMPUTING
9th April, 2018

Table of Contents

INTRODUCTION

Apik is Indian computer manufacturing company providing high quality laptops and computers to its customer established by Y Ashvin.

Mr. Ashvin left their respective job to open a computer manufacturing industry. He was the Sr. Hardware Engineer in a DELL company. But his mission was different, he wanted to start his own company, so he left job. In 2nd quarter of 2017, he found some partners from same technology, so he started planning and management process for computer manufacturing company. Apik is first computer manufacture company formed in India to provide cost effective computers to Indian people. Finally, Apik started trending of computers from January 2018. Apik entered in market with cheap rate and dynamic assemble service where customer can order computer or laptop with their specific configuration.

Apik started deploying their computers in government organizations and some small companies. On basis of these deployments, we got maximum orders from education organizations and many start-up companies in couple of months. Those contracts were made up of more than year with maintenance service. So that it effects flexibility to company which was helping to complete successful manufacturing with customers demand. Because of these contracts, Apik is very demanding computer manufacturing company in India. In next some years, Apik is planning for deployment in different countries. Our directors mission is to maintain relation with customers so that we can create a strong network.

Apik is famous because of their reliable and fast customer helping service. We are having approx.1500 employees working in Apik. All employees trying to simplify all challenges facing by company. We are proving continuous 24/7 maintenance service to our clients. We are delivering our best product and service with the help of our experienced employees. We are looking forward to inventing innovative ideas with successful deployments. Also providing training sessions to our employees for upgrading their skills and it helps to being familiar with latest technologies present in the world.

Primary Objectives of Apik over next couple of years are:

- Start manufacturing computers in foreign countries.
- Get new contracts from foreign companies and governments so that we can deploy our product worldwide.
- Maintain relationship with all clients to grow network in computer manufacturing market.

Apik wants to be in international market of computer manufacturing companies like Fujitsu, Dell, Lenovo, etc. We are trying our best efforts to grow our business constantly. Apik is focussing on research and development department to innovate new technologies with their computers and laptops. Our employees trying to innovate new things and implementing that things in our products so that product can capitate with another computer.

Annual revenue of apik is more than 4million euro which is too high. But as per computer manufacturing company, apik must invest their funds in product, marketing, expertise employee and customer service. If all these sections working very well, then only company will be able to achieve their mission.

Apik is planning to use cloud services like other companies but migration with whole company on cloud is not possible because of our busy workflow. So, our director decided to migrate each section separately so that work will be carry on. First, we decided to move our customer service section on cloud because customer relationship is more important than production. We are comparing in this report whether cloud service is good or not? If yes, why it is good? Which are the benefits for apik? So, we can see the exact difference between customer service on-premises vs cloud.

CUSTOMER SERVICE DEPARTMENT

Apik having huge data centers in Hyderabad and production team is in Mumbai, India. Our data center containing company data, employee data and customer data. We are having Terabytes of data in couple of months because of faster growth. Our clients referring us to other companies so that now the count of our customers are more than 2 lacs.

User has their requirements like they want specific hardware configuration in their laptops or computers. So that our employees take that request and assemble that specific computer on basis of user requirements and finally sell it to customer. As per user demand, we are developing our product so that our company is dynamic computer manufacturing company unlike other companies.

We are working with several modules such as Marketing, Sales, Production, Human Resource and Customer Service. Our teams are divided on basis of experience and seniority levels. The experienced employees leading the team with their respective tasks. We are having fresher team members in each team so that they can learn whatever we want. Then some experienced employees having their team with a single manager and one Sr manager who manage all managers. We are encouraging our employees to work with team so that they can interact with their colleagues and simplify challenges easily.

Customer Service:

Apik has reliable customer service that any other company. We have 24*7 continuous support for our customers. Our Head Quarter is in Mumbai, India. But we are providing our customer service via different stores and call centers. Our customer service is managed by experienced managers as well as we are using some software to maintain all records of employee and customers with proper security. We are having our approx. 10% staff in customer service. We need teams by dividing their specialization such as technical and non-technical employees. We are having multiple call centers so that all customer calls are responding properly. We have so many employees are working for these call centers and there are managers who has their team of specific department. We have specific departments as per shown below:

Customer Service Architecture:

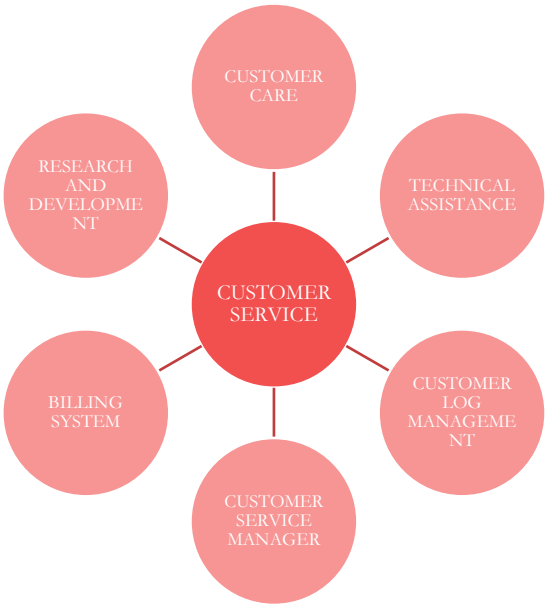
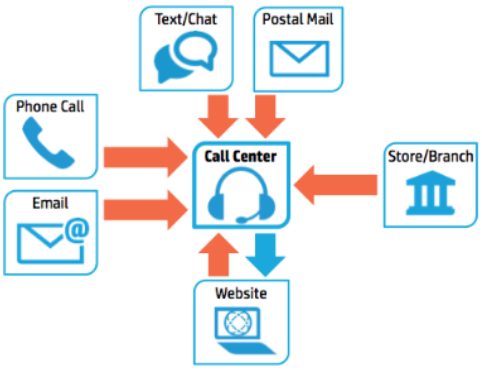


Fig. Customer Service Architecture for Apik

1. **Customer Care:**
   Customer can contact us by using following services:
   - Customer Service Helpline (24*7)
   - Email Service
   - Customer Care Stores
   - Live Chat Online
   - Social Forums



   If any customer having any problem in their computer or laptop, then they can either call to customer care anytime or email their query to us. So, we can provide online as well as offline support in short time. We are having our online self-service where customer must mention their problems on that page, our web application can automatically try to solve that query.

2. **Technical assistance:** Our technical assistance team always ready to solve technical software and hardware problems facing by customers. We are having online as well as offline service regarding technical assistance. If customer wants to solve their problem online, then either they must contact us by online chat or call. Our technicians help customers to solve their problems live. But if anybody don't know about computers and simply want to solve their problem, that customer has multiple options like either submit their laptop in nearest customer care or call us and we can send our technician to customer's location.

3. **Customer Log Management:** We are maintaining our customer log so that we know about detail customer review if that customer submitted their problem to our service. We can easily get history of that customer such as What product he bought? How many times he/she called us? What is the warranty status of customer? Was the previous problem solved or not?
   We are using advance customer log system to manage data properly and securely. These logs can use to maintain customer ratings, monitoring and analysing customer service.

4. **Customer Service Manager:** Customer service manager is responsible to provide accurate service to customers without having any single issue. He/she is distributing the teams by their technical and nontechnical departments. Manager's main goal is to satisfy needs of customers and maintain good relationship between customers and customer service. Manager can promote or devote their employees by getting feedback from customer.
   Manager using CRM software to maintain customer data. We are using Pipedrive CRM software to maintain all customer service in our department. This software gives us maximum facilities as compare to other CRM software. It is used to manage all customer information, emails, etc. with maintaining flexible customer relationship.

5. **Billing System:** Billing system is used to manage all payments and their bills which customer must pay. Billing section fetches warranty details and free service provided to customers, if the services are paid then based on problems, it generates cost of service.

6. **Research and Development:** This department always working on innovating new ideas on customer service. They are continuously watching on deployed system and trying to develop easy service so that customer will get solution in less time. They are taking logs of customers and developing easiest way of conversation from employees to customer. They can always be trying to improve self service provided by our company on our websites.

ON-PREMISES TCO ANALYSIS

Apik is having approx. 1200 employee working with different section. For Customer Service, we have 150 employees working continuously. Our headquarter is in Mumbai, India, on same location we deployed our call centre with 100 employees and other are our technical assistance team with managers, R&D engineers, network & server engineers, etc.

We are working with chain strategy in customer service. Customers can interact with us by using customer support. Then they transfer that customer to specific department such as business support and technical support. So that the process is maintain without any congestion or system failure.

Our call centre receives customer requests via internet, email, call, online chat, etc. Then they create a unique token for every customer complaint or request and provided further for their solution solution. Our business and technical assistance team try to solve their query by using 123Rescue Application which helps to access customer computer virtually.

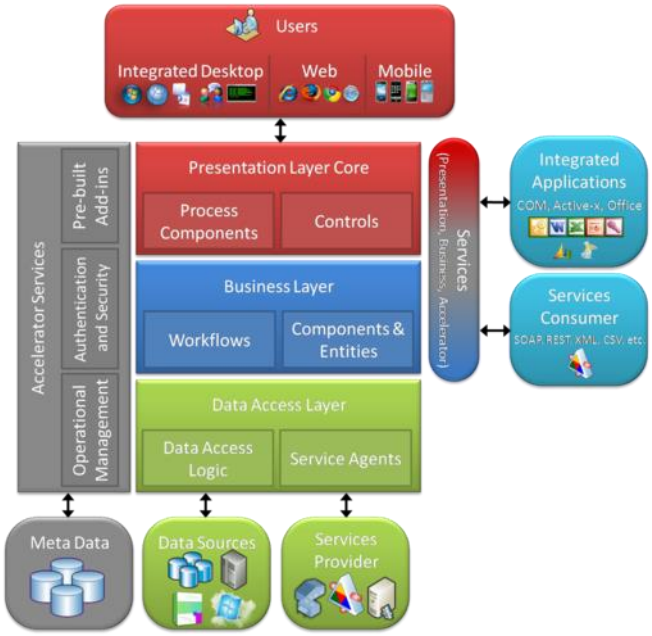


Fig.: On-Premises Customer Service Architecture

We are using HPE server in our datacentre which is in our headquarter itself. It is more than sufficient for storing all data of customer service department. MS SQL Server is used to process, operate and store tokens with customer information into database. Only authorize person can use that data for operations.

Customer Service Managers using pipedrive application to maintain logs of customers. With the help of this application, they can analyse customer history and status of their token whether it is solved or pending.

ON-PREMISES HARDWARE:

1. SERVER AND STORAGE

• Server: HPE ProLiant DL380 Gen9 E5*2620v4 (Intel XEON 8Core Processor/4TB/128GB DDR4)	€ 3849.99*
• VM instances with 123Rescue application	€ 91.58/month

2. NEWTWORK COST:

• Router HPE FlexNetwork HSR6602 XG	€ 14830.31*
• Switch Arista 7050X2 96SFP	€ 23932.27*
• Internet	€ 125.29 per month
• Palo Alto Firewall with ExpressVPN	€ 2300*

Total Hardware Cost: (For one year)

Item	Server (for 1 item)	VM Instances	Router (for 1 item)	Switch (for 2 item)	Internet	Firewall and VPN	Total Cost
Cost for 1 year	3849.99*1 = € 3849.99	91.58 * 12 = € 1098.96	14830.31*1= € 14830.31	23932* 2 = € 47864	125.29* 12 = € 1510.8	€ 2360	**€ 71514.06**
Cost for 3 years	€ 3849.99	€ 3296.88	€ 14830.31	€ 47864	€ 4532.4	€ 2360	**€ 76733.58**

ON-PREMISES SOFTWARE:

- Microsoft SQL server with license — € 11591.7* per core
- Bitdefender Antivirus — € 49.99 per device/year
- Pipedrive CRM Software — € 24.2 per month

Total Software Cost: (For one year)

Item	SQL Server (5 license copies)	Antivirus (5 license copies)	CRM Software (5 license copies)	Total Cost
Cost for 1 year	11591 * 5 = € 57955	49.99 * 5 = € 249.95	24.2 * 5 * 12 = € 1452	**€ 59656.95**
Cost for 3 years	€ 57955	€ 749.85	€ 4356	**€ 63060.85**

BUILDING INFRASTRUCTURE COST:

- Space and construction — € 15800*
- Server Room — € 20000*
- Electricity — € 300 per month
- Power Backup Generators — € 13700*
- Computers — € 529.99* per pc

Total infrastructure cost: (For one year)

Item	Construction	Server Room	Electricity	Generators	Computers (for 150 pcs)	Total Cost
Cost for 1 year	€ 15800	€ 20000	300 * 12 = € 3600	€ 13700	529.99 * 150 = € 79498.5	**€ 132598.5**
Cost for 3 years	€ 15800	€ 20000	€ 10800	€ 13700	€ 79498.5	**€ 139798.5**

LABOUR COST:

- Network Engineer — € 500 per month
- Customer Service Manager — € 475 per month
- Call Centre Employee — € 250 per month
- Technical Assistance Employee — € 400 per month
- R&D Engineer — € 450 per month

Note: employee payment scale is based on Indian payment scale so that payment is varies country wise.

Total labour cost: (For one year)

Employee Type	N/W Engineer (for 5 employees)	Customer Service Manager (for 5 employees)	Call Center Team (for 100 employees)	Technical Assistance Team (for 40 employees)	R&D Engineer (for 3 employees)	Total Cost
Cost for 1 year	500 * 5 * 12 = € 30000	475 * 5 * 12 = € 28500	250*100*12 = € 300000	400 * 40 *12 = € 192000	450 * 3 * 12 = € 16200	**€ 566700**
Cost for 3 years	€ 90000	€ 85500	€ 900000	€ 576000	€ 48600	**€ 1700100**

* one-time payment

Total Annual expense of company = 71514.06 + 59656.95 + 132598.5 + 566700 = € 830,469.51
Total 3years expense of company = 76733.58 + 63060.85 + 139798.5 + 1700100 = € 1,979,692.35

As we can see, our annual income is approx. 0.8M Euro and total 3-years expense for 2018-20 is 1.9M Euro approximately. It contains all tax required by governments and hidden cost with maintenance cost required by servers and other things.

ON-CLOUD TCO ANALYSIS

Cloud Computing is nothing but computing over internet. People can store and access their data from anywhere in the world using cloud. Many companies are starting to migrate their business with cloud. Cloud provides facilities which can fulfil business demands within cheap budget that their on-premise budget.

Cloud platform having benefits which can help to grow business and save their funds. Benefits of cloud platform are as follows:

- Flexibility: Companies can expand their facilities over cloud anytime.
- Recovery/Backup: We can easily store our data over cloud. Clouds providing services for backup and recovery of their data monthly. So that if any server crashes or deleted their data, then they have another backup on cloud and companies can import their whole data anytime whenever they want.
- Automatic Updates for Software: Cloud provides automatic update feature for software. Apik using 123Rescue application for accessing customer computer virtually. So, if any new version coming in future then management has not taking care of these updates, cloud services automatically fetch new version and updates application on cloud itself.
- Cost saving: Cloud platform providing virtual storage as well as virtual instances instead of physical servers and computers so that hardware cost has been saved. Cloud is providing on demand service so customer paying only for limited time which helps to save budget.
- Security: Cloud providing 100% security assurance for data and operations made over cloud.

There are so many cloud services such as Amazon Web Services(AWS), Oracle Cloud, IBM cloud, Microsoft Azure, etc. Apik decided to use cloud services for their customer service department. We started planning for migration to on-premises to cloud platform. We searched for many cloud services, finally decided to use Amazon Web Services(AWS) private cloud. AWS has spot instances EC2 and EBS which Apik wanted to use. AWS is perfect solution for Apik because functions and features required by company are satisfying by these instances so Apik is trying to migrate on AWS.

AWS SPOT INSTANCES:

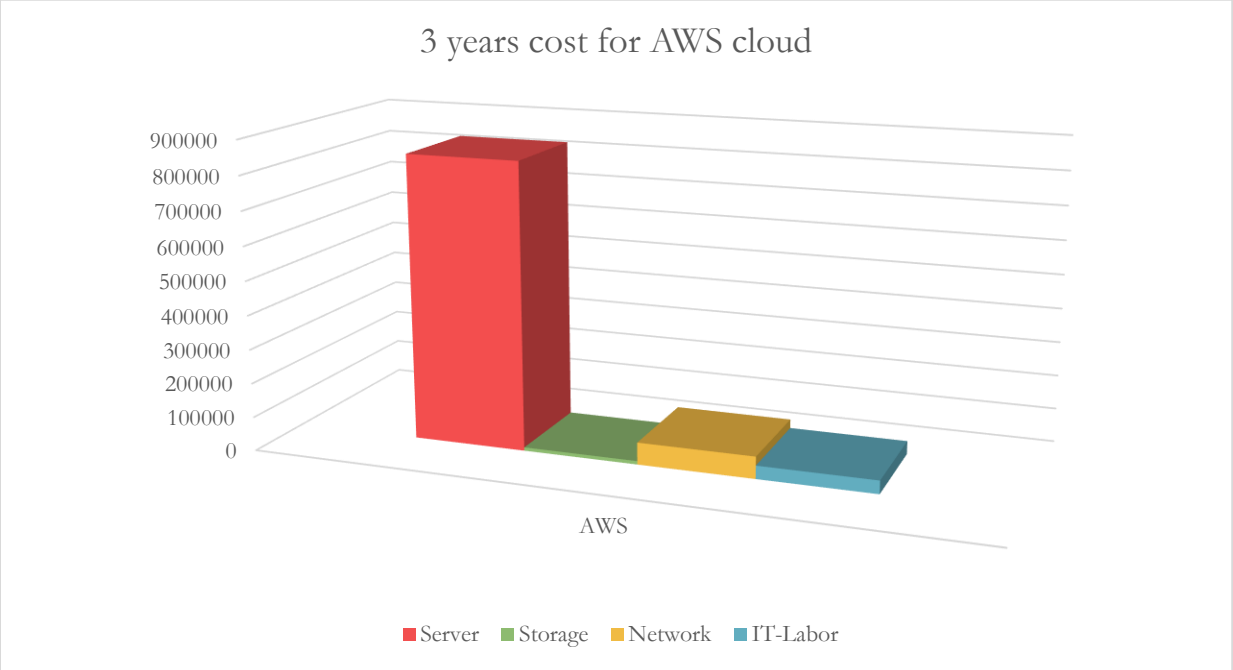
Apik is planning for following spot instances for company:

1. **Amazon Elastic Compute Cloud(EC2):** EC2 providing reliability, security, elasticity, performance and control with low prices. It is better solution to maintain heavy workloads over cloud. If any one of our instance stop working, then it automatically switching their instance on another instance so that work cannot be stop. It is integrated service with using Hadoop map reduce technology to maintain millions of data on single platform without any losing the data.

2. **Amazon Elastic Block Store(EBS):** EBS providing storage which we can attach easily to EC2. We can create a file system, run database, increase storage on EBS. Instead of using physical storage AWS providing EBS for storing the data. It is secured data storage with monthly backup option so that company can access and store data securely.

AWS TCO ANALYSIS:

AWS having TCO calculator provided on their website. We can calculate our budget by using that calculator.



AWS EC2 Instances Cost for 3-years (2018-2020):

Total Costs = (upfront cost + hourly cost * 8784 hours/year * 3 years) * number of instances (applied to the whole term whether you're using the reserved instance)

3-year Partial Upfront Reserved Instances			
AWS Instances	Upfront	Hourly	Total Cost
db.m4.2xlarge	€ 2960	€ 0.201	**€ 824759**
Total Cost			**€ 824759**

Total Cost = (hourly cost * 8784 hours * 3 years * utilization) * number of instances (hourly usage fee charged for each hour you use the instance)

On-Demand			
AWS Instance	Upfront	Hourly	Total Costs
db.r3.2xlarge	0	€ 0.679	**€ 1790249**
Total Cost			**€ 1790249**

Lowest Price Instance:

EC2 lowest instance price for 3years:	**€ 824759**
	€ 58025
AWS Business Support (EC2):	
Discount:	5 %
Total EC2 cost of 3years with discount and support:	**€ 841547**

Storage cost of AWS:

Starting capacity(GB):	1904.64
Equivalent EBS storage volume:	General Purpose (Magnet)
Number of EBS volumes required:	2
EBS volumes cost/month:	€ 92.18
Initial snapshot cost (one time):	€ 159.23
EBS incremental snapshots cost/month:	€ 159.23
Total EBS cost/month:	€ 251
EBS cost for 3 years (without IOPS):	€ 9210
EBS cost for 3 years:	€ 10008
AWS Business Support:	€ 798
Total Storage cost for 3years of AWS:	**€ 10008**

AWS support cost:

EC2 monthly spend:	€ 13952.52
EBS monthly spend:	€ 255.84
Monthly data transfer spends:	€ 1660.66
Total monthly AWS spend:	**€ 15869.01**

Business level support:

10% of monthly AWS usage:	€ 880.00
7% of monthly AWS usage:	€ 494.83
Monthly support cost for all AWS services:	€ 1375
Support cost for all services for 3 years:	€ 49494
EC2 upfront reserved instance cost with discount:	€ 281230
Total AWS support business cost for 3-years:	**€ 64003**

Total AWS cost for 3years:

Server Cost	Storage Cost	AWS support cost	Business support	Hidden Cost	Total Cost
€ 841547	€ 10008	€ 15869.01	€ 64003	€ 24090.99	**€ 955,518**

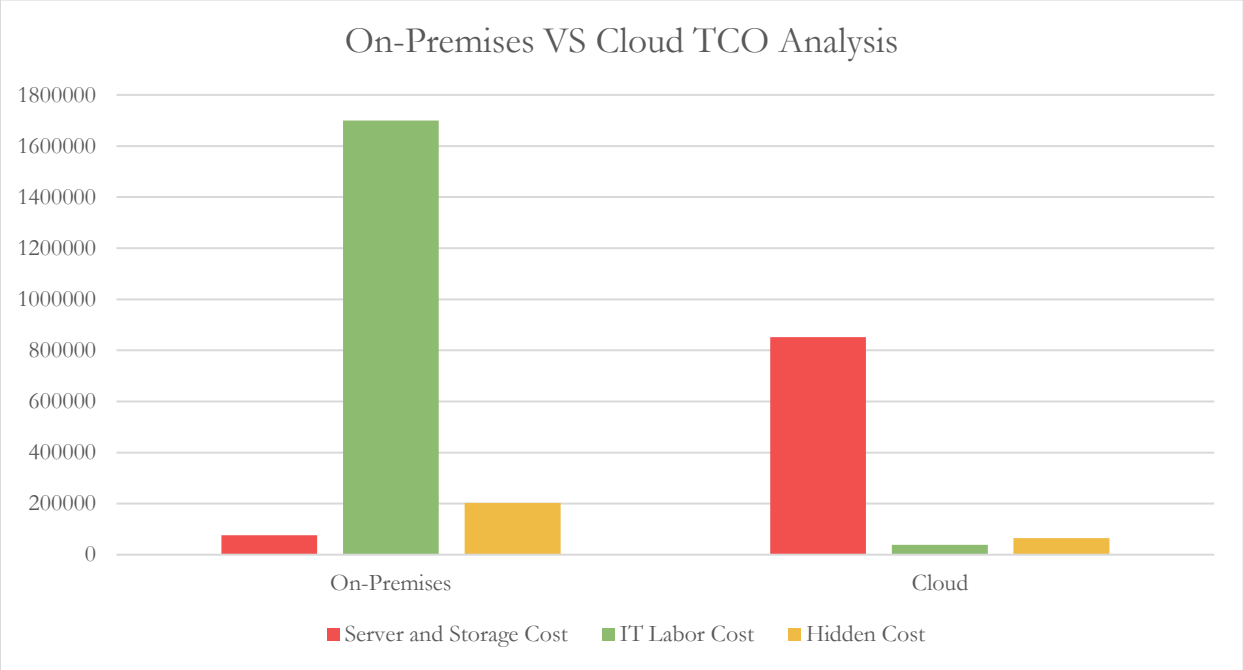
ON-PREMISES VS CLOUD TCO COMPARISON

On-premises having total budget of €1.9M approximately with all cost. Comparing with cloud services it is just approx. €0.9M which is exactly 48% of on-premises cost. Means by migrating business from on-premises to cloud, we are saving 52% funds in cloud.

As per our calculations, server and storage cost for cloud is more than on-premises but if going through IT labour cost and hidden cost, on-premises is having large cost. Simply cloud is saving our funds in labour and hidden cost. Now, lets see the detail cost comparison between on-premises and cloud services.

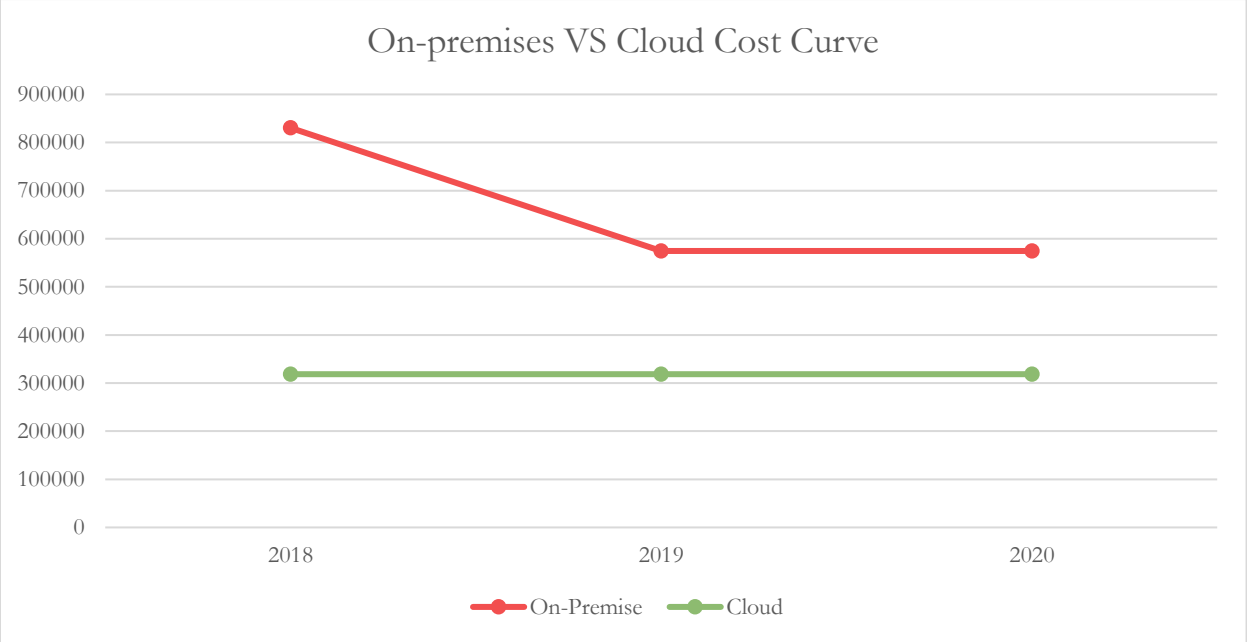
On-Premises VS Cloud TCO Analysis (for 3-years):

Comparison	On-Premises	Cloud
Server and Storage Cost	€ 76733.58	€ 851555
IT Labour Cost	€ 1700100	€ 39000
Hidden Cost	€ 202858.77	€ 64963
Total	€ **1,979,692.35**	€ **955518**



TCO Analysis for 3years for On-Premises and cloud:

TCO Comparison	2018		2019		2019	
	On-Premises	Cloud	On-Premises	Cloud	On-Premises	Cloud
Server and Storage Cost	€ 76733.58	€ 280515.67	€ 0	€ 280515.67	€ 0	€ 280515.67
IT Labour Cost	€ 566700	€ 13000	€ 566700	€ 13000	€ 566700	€ 13000
Network and Hidden Cost	€ 187035.93	€ 24990.33	€ 7911.42	€ 24990.33	€ 7911.42	€ 24990.33
Total	**€ 830469.51**	**€ 318506**	**€ 574611.42**	**€ 318506**	**€ 574611.42**	**€ 318506**



Finally, for moving to cloud there are some benefits which are important to decide whether which platform is best:

Feature	On-Premises	Cloud
Cost	It is much 58% costlier than cloud	All services are very cheaper than on-premises
Reliability	If any server goes down, then the work is stop until next server is configured. It is monitored by limited time	Active continuously. If server goes down or crashed automatically switched to another server within some seconds so that server never stop. It is monitored by 24*7
Flexibility	For this, we can access data only from headquarters.	Cloud provides flexible service so that access data from anywhere.
Security	It is secured but not much as cloud. It requires special labour and software for securing data	Cloud is highly secured. Security is maintained by cloud itself, so no extra labour or software require.
Upgrades and Maintenance	It requires upgrade and maintenance for in every specific time.	All upgrades and maintenance are done by cloud services.
Growth and Expansion	If company wants to increase our storage or customize some services, then company must do it within off time.	If company wants extra storage, then they can easily expand over worktime without any stoppage.

TCO RECOMMENDATIONS

As we can see, by using cloud service company saving their 48% funds over on-premises cost. Also, if company started using cloud services, then company can grow business immediately. Instead of investing money in on-premises, we can use these saving funds in production so that our production rate will be increase and we can achieve our goals.

Reliability will be maintaining if we deployed our customer service module on cloud. Customer services may not be going down anyway. All security concerns will be vanishing if cloud services used. Processing speed of AWS cloud service is faster than on-premises architecture so that our department will work faster than now.

Finally, as we can see the cost and features, AWS public cloud service is best option instead of on-premises architecture. Instead of using server rooms, building architecture, highly expertise labours, different license and security, we can simply use EC2 and EBS for our customer service section. It will be responsible for our growth ad highly reliable and secure service in future.

Also, as per AWS service, they are invented new technology rekognition. Rekognition is technology developed by amazon. It is part of AWS Artificial Intelligence(AI) project. In this module, was provide an API to their application. This API is used to identify object by using image or video. It is better option if anybody wants to detect or analyse any object without watching that video or picture.

After migrating to cloud, Apik may be interested to use this API provided by amazon. Apik having their customer self-service option for registering their problem. If we use that rekognition API then customer can add their problems with picture or video on our self-service portal and we can automatically detect the problem with customer device without reading any single heading or description given by customer. So that our assistance will help customer in short time.

BIBLIOGRAPHY

1. Average Growth Rate for Start-ups (2016) [Online] Available at: https://www.equidam.com/average-growth-rate-for-startups/ [Accessed 1st April, 2018]
2. Customer support Introduction (2016) How to Set Up Your Customer Support Department from Scratch [Online] Available at: https://www.helpscout.net/helpu/customer-support-department/ [Accessed 1st April, 2018]
3. Pipedrive Application (2018) [Online] Available at: https://www.pipedrive.com/en/plans [Accessed 1st April, 2018]
4. HPEServer [Online] Available at: https://marketplace.hpe.com/pdp?prodNum=826682B21&country=us&locale=en&catId=15351&catlevelmulti=15351_3328412_241475_7271241 [Accessed 1st April, 2018]
5. VMWare Workstation 14 Pro (2018) [Online] Available at: https://www.logmeinrescue.com/pricing [Accessed 1st April, 2018]
6. HPE Router [Online] Available at: http://www.curvesales.com/HP-HSR6600-Router-Series.asp [Accessed 1st April, 2018]
7. HPE Switch [Online] Available at: https://www.hpe.com/us/en/product-catalog/networking/networking-switches/pip.specifications.arista-7050x2-96sfpplus-8qsfpplus-back-to-front-ac-switch.1009763432.html [Accessed 1st April, 2018]
8. Indian Internet Rates (2017) The fastest wired broadband internet service providers in India [Online] Available at: https://www.firstpost.com/tech/news-analysis/the-fastest-fibre-optic-internet-providers-in-india-3698701.html [Accessed 1st April, 2018]
9. Palo Alto Networks Price List [Online] Available at: http://www.soliditnetworks.com/company/dir-contracts-state-of-texas-dir/dir-contracts-state-texas-dir-dir-pricing-lists/palo-alto-networks-price-list/ [Accessed 1st April, 2018]
10. Express VPN (2018) [Online] Available at: https://www.expressvpn.com/order [Accessed 1st April, 2018]
11. MS SQL (2018) [Online] Available at: https://www.microsoft.com/en-ie/sql-server/sql-server-2017-pricing [Accessed 1st April, 2018]
12. Bitdefender Antivirus (2018) [Online] Available at: https://www.bitdefender.com/solutions/internet-security.html [Accessed 1st April, 2018]
13. AWS Cloud Migration [Online] Available at: https://i.ytimg.com/vi/uVuFDdmXsRo/maxresdefault.jpg [Accessed 5th April, 2018
14. General Cloud Migration [Online] Available at: http://www.arcurve.com/tech-blog/post/software-business/2016/09/29/to-be-or-not-to-be.-what-is-your-cloud-strategy [Accessed 5th April, 2018]
15. EC2 (2018) EC2 Product Details [Online] Available at: https://aws.amazon.com/ec2/spot/details/ [Accessed 5th April, 2018]
16. EBS (2018) EBS Product Description [Online] Available at: https://aws.amazon.com/ebs/details/ [Accessed 5th April, 2018]
17. AWS AI Feature (2018) [Online] Available at: https://aws.amazon.com/machine-learning/ai-lex-polly-rekognition/ [Accessed on 9th April, 2018]