

Capstone Project Final Report – Group 11

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Abstract:

The Capstone Project develops a cloud-based data solution application based on pre-set requirements and resolves an existing problem of having to visit workplaces in person during these Unprecedented times of the Covid-19 Pandemic. The Capstone project which is named NextGen Cloud is a Call Centre that is based Out of the cloud. This would replace the traditional/Office based call center. Built out of plethora of Amazon web services (AWS) and within the amazon connect console, NextGen Cloud would offer Sales, Call based support by an agent. The customer service representative would be able to connect from various devices and assist customers. As this is a team Project, we have developed a plethora of experience working in project Environments. The Design of the Project is supported by documented market research, a marketing plan and a business plan.

Keywords: Customer Service, Call Centre, Cloud Computing, Analytics, Tag Management, Business Management

1. Introduction

With the abrupt appearance of the COVID19 emergency Amazon Connect can be an extraordinary answer for some, contact focuses looking to rapidly move their call place operators to a home/far off specialist situation. Today, call focus is an 22-billion-dollar industry and is ruled principally by on-premise and other programming arrangements and heritage players. Even today on-premises frameworks have held a solid offer in the market.

As of late, the notoriety of cloud-based answers for call focuses is on the ascent. In any case, in spite of that, a significant piece of the contact community industry has picked to adhere to on-premise programming Today, cloud-based call place arrangements are in incredible interest. The explanation behind that is the enormous measure of advantages offered by it. Some of them incorporate simplicity of setting up, financially savvy and adaptable.

Simultaneously, as referenced previously, numerous organizations, especially the enormous ones are still somewhat reluctant to get rid of their on-location call focus programming. On location call focus arrangements may appear to give a serious extent of unwavering quality. At the point when any catastrophic event, for example, a fire or a flood influences the immediate phone lines, the call community may confront blackouts. In any case, cloud-based contact community programming is fueled by debacle recuperation highlights. Since the



of cloud-based programming is done through the web, there is no requirement for you to stress over any abrupt unexpected occasions that may influence or disturb your phone services. Moreover, many virtual contact center providers provide several layers of redundancy and backup mechanisms so that a failure of a single point will hardly affect your contact center.

On-premise programming for your call place needs establishment and ordinary upkeep of the supporting equipment, for example, direct lines and PBX telephones. In spite of the fact that every one of these things may give a feeling of extra unwavering quality, most definitely, it isn't the most ideal alternative by any means.

The Amazon Connect is a cloud-based answer for a current issue of having an In-house based call community. It replaces the customary office-based environment for tending to client questions through help calls. The amazon associate is additionally omnichannel cloud contact focus that assists organizations with giving predominant client care at a lower cost. Planned from the beginning to be omnichannel, Amazon Connect gives a consistent encounter across voice and visit for your clients and specialists. This incorporates one lot of apparatuses for abilities based directing, ground-breaking constant and authentic examination, and simple to-utilize natural administration devices — all with pay-more only as costs arise valuing, which implies Amazon Connect disentangles contact focus tasks, improves operator effectiveness, and brings down expenses. You can set up a contact place in minutes that can scale to help a great many clients.

1. Blueprint of Project - NextGen Cloud

Below is the blueprint of how we planned and executed the NextGen Cloud Project. Every Team Member has been briefed and have taken Individual responsibility in ensuring weekly targets are met.

We have divided our project into four stages. **Step 1** deals with Creation of Instances which are stored in the S3 bucket and assigning Identity Access Management Features among all 4 team members. **Step 2** is about Setting up phone numbers, allocating roles among team members. **Step 3** is critical which is about Setting up routing to ensure seamless connectivity. **Step 4** is creation of contact flow to ensure distribution of customer support activities. **Step 5** is user creation and mock calling assigning phone numbers. **Step 6** is final step which involves Testing and deployment.



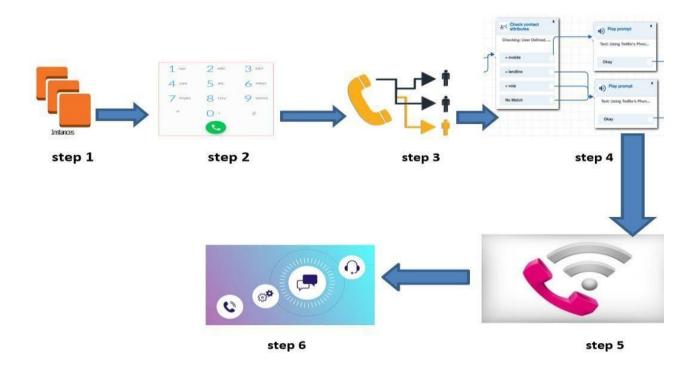


Figure 1: The Project – NextGen Cloud Blueprint

We Further sub-divided our blueprint into weekly progress reports. Each week which spanned over a 12-week period we further subdivided the report into weekly progress reports which were instrumental in designing our project and meeting deadlines.

In the subsequent sections we discuss the various platforms and the mechanisms we have used to develop the NextGen Cloud - Capstone project.



2. Amazon Connect

The Amazon Connect is a cloud-based solution to an existing problem of having an In-house based call center. It replaces the traditional office-based atmosphere for addressing customer queries through support calls.

Figure (2) Demonstrates the entire workflow of the Amazon Connect Platform. The following sections of the report will demonstrate the steps we followed to create, deploy and test this platform.

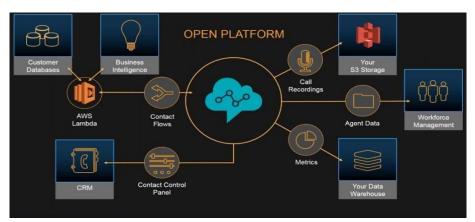


Figure 2: Amazon Connect workflow and flowchart

3.1 Creating the Instances

The first and basic step in making a contact place based out of Amazon web administrations is the production of Instances. Amazon Connect is incorporated with AWS Directory Service. At the point when you make your occasion, you'll be incited to look over one of the accompanying characters the board arrangements upheld in Amazon Connect.

 Storing users with Amazon Connect: We will have to choose this option of storing the users within the amazon connect console. This is useful for small organizations. This also Includes a AWS Directory Service instance that will be created in our AWS account. The users within the Amazon connect, the username and the password.



Link to an existing directory:

We will have to choose this option to link an existing directory to the existing directory. If we choose this option, then the directory must be associated with the AWS Directory Service Account.

Also, if we decide to choose this service of the linking to an existing directory, it is possible to do so only if we already existing amazon connect console.

SAML 2.0-based authentication: The Last option in the Amazon Connect
Console is using the option of SAML based authentication. If we would like to
connect the console across multiple devices and run a plethora of platforms
the SAML authentications is the right option to do that.

Figure (3) Demonstrates the creation of Instances, Identity Management using the various scenarios we discussed above

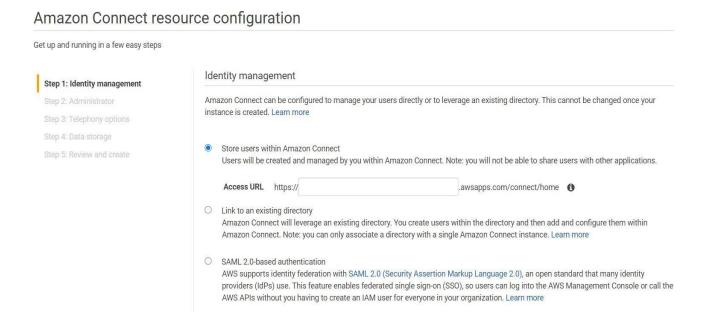


Figure 3: Creating Instances using Amazon Connect



3.2 Creation of Queues:

We have 3 departments to handle the Customer Queries: The Sales Department, a separate Call support queue to address any issues after a purchase, and the billing queue which is dedicated to addressing all billing queries.

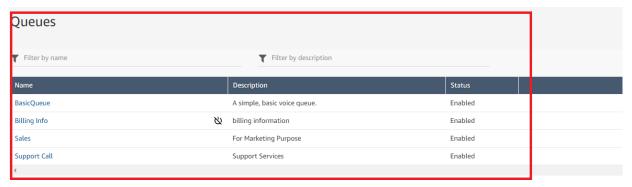


Figure 4: Creating Queues within the Amazon Connect

Each Individual Queue has a separate prompt associated with it. With the usage of Amazon Polly, we have recorded the prompts and then Integrated these prompts into the Queues. We have successfully created and published all our prompts which aids our call mechanism.

The creation of prompts was possible using Amazon Polly which converts the text into life-like speech. These prompts will be the Welcome prompt, End of call prompt, Hold prompt, Error input Prompt and the Office hours prompt. We have further subdivided the Office hours prompt into Out of office hours prompt and In Office hours prompt.



3.3. The NextGen Cloud Contact flow diagram

The Below screenshot shows the final NextGen Cloud Contact flow diagram deployed on the Amazon connect console. A contact flow defines the customer experience with your contact center from the beginning. At the most fundamental level, contact flows enable us to customize your IVR (interactive voice response) system. *Figure (5)* and *Figure (6)* represent our two contact flow diagrams which successfully execute our project NextGen Cloud.

The Contact Flow Diagram give us details about the NextGen Customer Queue Flow. That is this is the flow the customer would Follow upon reaching the NextGen Cloud call center. At the beginning the user is given the choice to enter options either using the keyboard or using the voice which has been Integrated using amazon polly and amazon Lex.

If there is a scenario where the user enters an erroneous input, the customer will be redirected back to the initial call flow of entering the options. Corresponding attributes have been entered in this call flow to handle erroneous input from the user. If the user enters multiple prompts the user will be redirect to the original contact point.

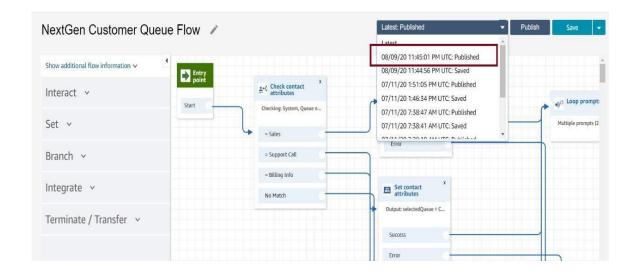


Figure 5: Contact Flow Diagram-1



Figure (6) Demonstrates the NextGen Cloud Inbound contact flow diagram. This contact flow diagram is responsible for executing the flow successfully and then routing the call to the customer successfully. We have also successfully Integrated the Amazon Lex Feature into this contact flow diagram.

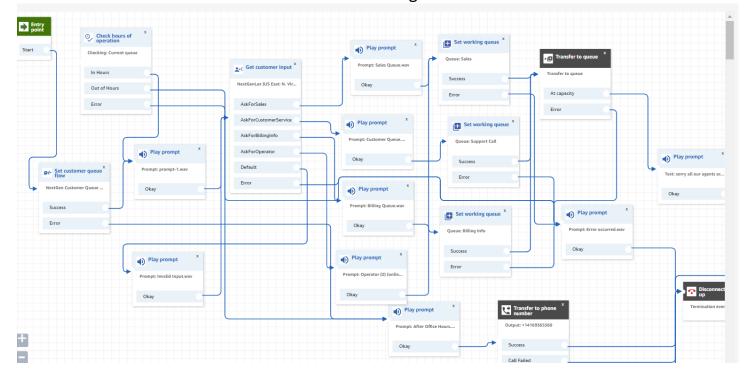


Figure 6: Contact Flow Diagram 2

If the user enters the contact center outside of the office hours, the user will be given a prompt as to reach out to us during the business hours. Further details about the hours of operation of NextGen cloud is discussed in the following sections. user enters an erroneous input; the customer will be redirected back to the initial call flow of entering the options.

If the user reaches the sales queue, the sales queue prompt is played, if the user reaches the billing queue, the billing queue prompt is played and If the user reaches the customer care queue, the customer care prompt is played

All queues can handle erroneous input form the user in the form of redirecting the user to the original contact point. We have ensured at no point the call is disconnected Or the user is not redirected to the wrong designated queue.



3.4 User Management

The user management profile is nothing but managing the agents, assigning mangers, quality analysis. As we are a group of 4, we have ensured we are giving maximum space and roles to all our team members.

Below is a screenshot from the user management dashboard from the amazon connect console Which has the details pertaining to all our team members along with their roles assigned.

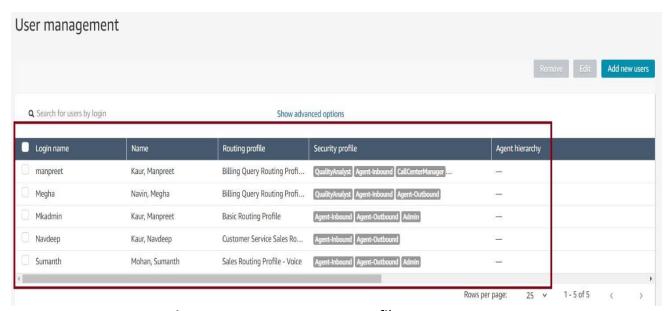


Figure 7: User Management Profiles

3.5 Routing Profiles

- We have 3 departments to handle the Customer Queries: The Sales
 Department, a separate Call support queue to address any issues after a
 purchase, and the billing queue which is dedicated to addressing all billing
 queries.
- The 3 Queues Sales Queue, Customer Care Queue and the Billing Queue have all been added to the Routing profile. By Default, we intend to route the customer to the Sales Queue which is selected in the routing dashboard as seen in the below Screenshot.



Name	Description	No. of associated queues	No. of agents staffed
Basic Routing Profile	A simple routing profile.	4	1
Billing Query Routing Profile - Voice	This profile will handle Billing Queries	1	2
Customer Service Sales Routing Profile - Voice	This profile will handle Customer Service	1	1
Sales Routing Profile - Voice	This profile will hadle voice contacts from Sales Queue	1	1
1)
		Rows per page: 25 V	1 - 4 of 4 < >

Figure 8: Routing profiles

3.6 Security profiles

A security profile is a group of permissions that map to a common role in a contact center. For example, the Agent security profile contains permissions needed to access the Contact Control Panel (CCP). We're not using default AWS security profiles anymore. After testing, new security profiles have been Created and Allocated to respective agents.

The below screenshot has one security profile created for the Agent-Inbound which can provide permissions for the Inbound calls and the Agent-Outbound security profile is created to handle agent outbound permissions. Below is screenshot from our amazon connect console which demonstrates the security profiles.

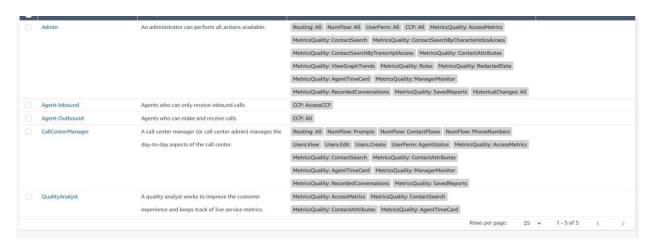


Figure 9: Security Profiles



3.7 Hours of operation

One of the primary needs of any commonly is staffing. To ensure we always have maximum availability we have followed the below Hours of operation. The NextGen Office hours is set based on the maximum call volume time to ensure we are resolving customer queries as soon as possible.

Figure (10) Represents the hours of operation set on the dashboard of NextGen Cloud inside the amazon connect console.

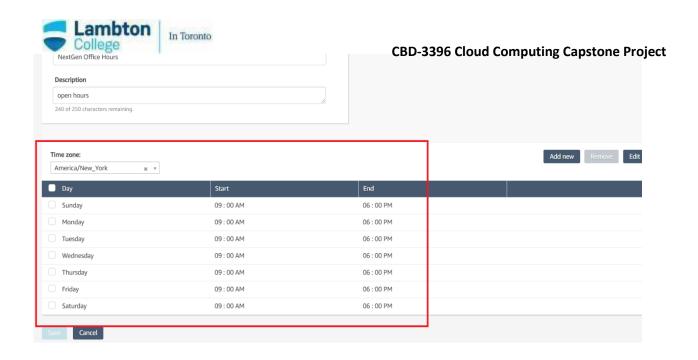


Figure 10: Hours of Operation of NextGen Cloud



3.8 Real Time metrics

The In-bound and out-bound calls are tracked on the Real Time Metrics which is part of the Amazon connect console. Using these features, we can monitor traffic into our website and monitor call logs on the amazon connect console.

To be specific, any inbound/outbound call into and from the call center would be monitored on the Real Time metrics. This would Enable us to plan our agent needs like:

- 1) Agents Availability
- 2) Number of Agents required based on call volume
- 3) Quality Analysis of the call
- 4) Internally credit employees for First call Resolution (FCR)
- 5) Ensure we are placing the customer on hold for a minimum amount of time
- 6) Missed calls (if any) by the call center. We will ensure we call back if this happens.
- 7) Following the best business practices.

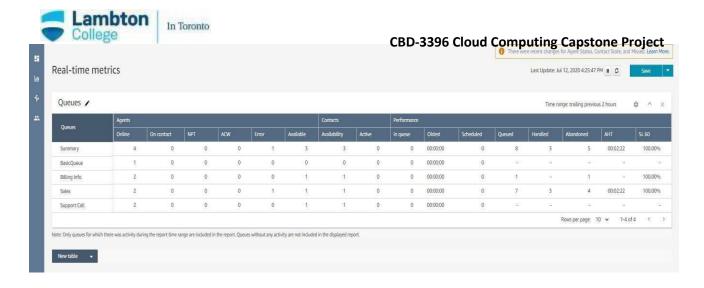


Figure 11. Real Time Queue Based Metrics as recorded on our dashboard

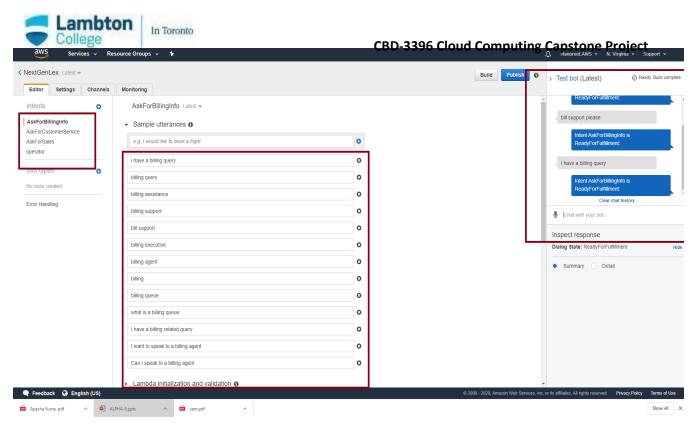
4 .Amazon Lex

Amazon Lex is a help for building conversational interfaces into any application utilizing voice and text. Amazon Lex gives the propelled profound learning functionalities of programmed discourse acknowledgment (ASR) for changing over discourse to text, and regular language understanding (NLU) to perceive the expectation of the content, to empower us to fabricate applications with exceptionally captivating client encounters and exact conversations.

Customers after calling NextGen Cloud will be able to enter voice as input as well as key in a specific digit as the Input. For example: The customer can say "Sales team" or press 1 and our contact flow will redirect them to the Sales Team.

To Provide an Omni-channel experience to users, we have integrated the amazon Lex with the amazon connect console to demonstrate our operational capabilities. To ensure we adhere to user's flexibility, we give the customer the choice to enter the option either using the keyboard or simply just say the name of the team the customer would like to connect.

Below is the screenshot from our Amazon Lex Dashboard which Indicates the various capabilities of the bot.



5. NextGen Cloud Website

The Website https://www.nextgencloud.xyz/ has been Implemented on the Google Tag Manager (GTM) and we are now tracking Website traffic on Google Analytics (GA). We have Implemented two tags on the website, one the Global Tag and one is the conversion Tag.

We decided to have a website was to enable customers to first go through what the NextGen Cloud concept stands for and they can also get an experience of the various services we have to offer. Customers can call us on the numbers mentioned or contact us over email or a chatbot which has been Integrated on our website.

The Global tag has been Implemented on all pages of the website and Conversion Tag has been Implemented on the order confirmation page only. Additionally, we are also having a bot on the website where customer can enter details like Email ID, phone number or even a specific time of discussion with our agent. These details are delivered to our Email and we will reach out to the customer according to the customer expectations. This can be carried our both on the Website as well as mobile devices.

Below is the Logo of NextGen Cloud with the tagline "We are on the cloud; we are at your service"



Figure 13: The NextGen Cloud Logo

Below is the Screenshot of the NextGen Cloud Homepage. The website is live on the internet and can be access with the URL: https://www.nextgencloud.xyz/



Figure 14: The NextGen Cloud Website

6. NextGen Cloud Application

In an Era of Omni-channel operations it is important to enable access to users across plethora of platforms. The NextGen Cloud is about ensuring the customer has a very good experience after visiting our plethora of platforms. One such platform which we have extensively worked to develop is the NextGen Cloud Application.

The NextGen Cloud application works across multiple; all the mobile devices and we have also successfully placed tests to validate the tracking reporting, working across the User Interfaces on our application. As discussed on our weekly reports, we have performed the various operations of developing an application and have demonstrated it on an android platform called – Blue stacks as seen in the below Figure (15)

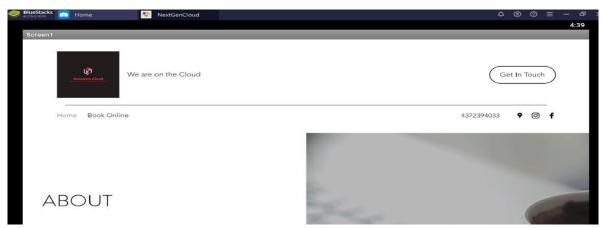


Figure 15: The NextGen Cloud Application

Once we successfully developed the website, we have placed tests across multiple devices to validate the working reporting. The google Analytics has also been integrated into the NextGen Cloud Application.

Additionally, we are also having a bot on the website where customer can enter details like Email ID, phone number or even a specific time of discussion with our agent. These details are delivered to our Email and we will reach out to the customer according to the customer expectations. This can be carried our both on the Website as well as mobile devices. The Below screenshot demonstrates the testing methodology we have used to test NextGen Cloud across mobile devices to tests its responsiveness.

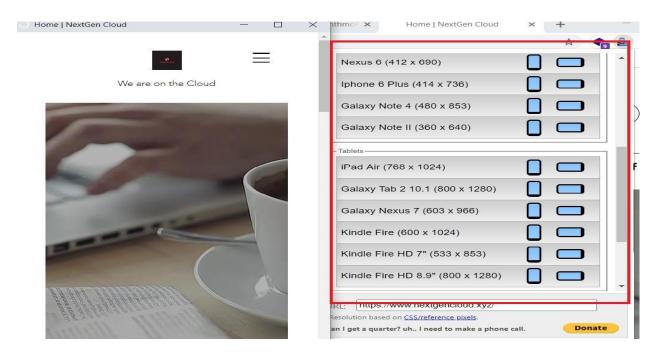


Figure 16: Mobile Testing of https://www.nextgencloud.xyz/ across multiple devices

7. Google Analytics

The Google Analytics is a web examination administration offered by Google that tracks and reports site traffic. Google Tag Manager is a label the board framework (TMS) that permits you to rapidly and effectively update estimation codes and related code parts on the whole known as labels on your site or versatile application.

The NextGen Cloud Google Analytics platform is live and published. We can track and plan our business model based on the plethora of details we get on the Google Analytics dashboard including tracking down the country, city of the user visiting our website. The below screenshot demonstrates the various options we have on our Google Analytics dashboard.

- The circles seen below Indicate the tracing of the location (which can be divided based on city, province, country and continent)
- We can monitor traffic both on the website as well as the mobile platform as seen in the below screenshot.
- We can also divide and get number of users which are reported on the Google Analytics dashboard based on the number of users who are active/were active within 30mins.
- We can track the user flow onto the website. That is users may just visit the homescreen, may try pacing an order, might try reaching out to our customer support agents. Based on these details we can work on re-designing our website and plan our business goals for the NextGen Cloud.

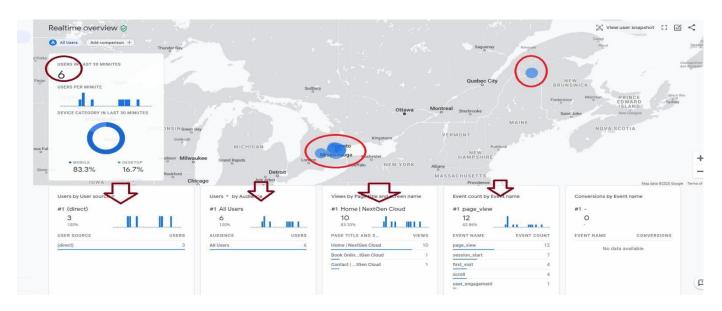


Figure 16: The Google Analytics dashboard of NextGen Cloud

The Below figure demonstrates the plethora of graphs, reports we can generate using the Google Analytics Platform.

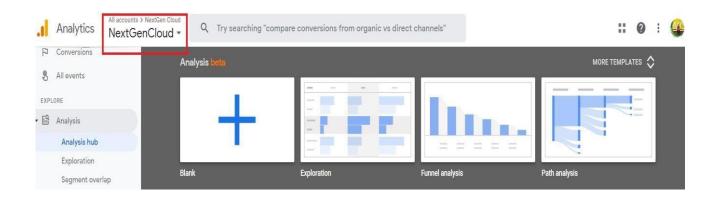


Figure 18: The various reports that could be generated on the Google Analytics Platform

8. Google Tag Management

Google Tag Manager is a device that permits us to oversee and convey advertising labels (bits of code or following pixels) on your site (or versatile application) without altering the code.

Data from one information source (your site) is imparted to another information source (Analytics) through Google Tag Management.

Why did we need the GTM on NextGen Cloud?

- One of the Primary Reasons we Implemented the Google Tag Management on both our website and application was to detect and update real time traffic coming into our website and application. This is part of our business model to get more users to Join the NextGen Cloud Platform and for potential business expansion.
- The Global tag has been Implemented on all pages of the website and Conversion Tag has been Implemented on the order confirmation page only.
- The figure (19) is a screenshot from our Google Tag Management console which have the tags Implemented.



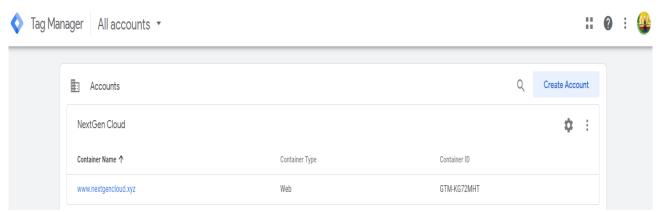


Figure 19: The Google Tag Management dashboard of NextGen Cloud

Once we have created the Google Tag Management container, we have Implemented tags to connect the tag management to the Google Analytics. By doing this, we can track, deploy and monitor website and app-based traffic in real time. The below figure is the Google Tag Management console where we have deployed the tags successfully and linked it to the Google Analytics Account.

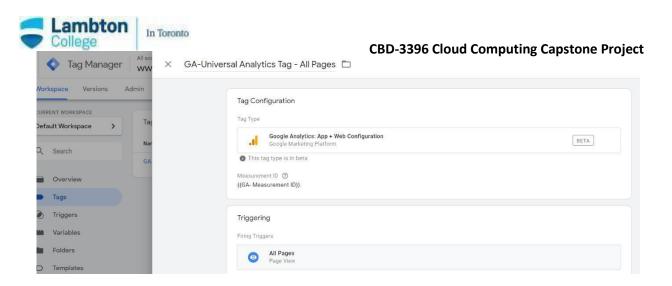


Figure 20: The Integration of Google tag Management – Google Analytics.



9. Conclusion

The NextGen Cloud - The Capstone Project develops a cloud-based data solution application based on pre-set requirements and resolves an existing problem of having to visit workplaces in person during these Unprecedented times of the Covid-19 Pandemic. The customer service representative would be able to connect from various devices and assist customers. As this is a team Project, we have developed a plethora of experience working in project Environments. The Design of the Project is supported by documented market research, a marketing plan and a business plan. The Capstone project which is named NextGen Cloud is a Call Centre that is based Out of the cloud. This would replace the traditional/Office based call center. Built out of plethora of Amazon web services (AWS) and within the amazon connect console, NextGen Cloud would offer Sales, Call based support by an agent. The NextGen Cloud application Intends to resolve a plethora of operations including

- 1) Avoiding the physical presence of agent in an organization.
- 2) Avoiding Disaster and aid Disaster Recovery.
- 3) Increasing Mobility of the agents to connect from any location.
- 4) Avoiding physical damages to the hardware.
- 5) Cost-effective for the company to avoid expenses in the form of rent and utilities.
- 6) More Choices in Terms of Labor.
- 7) Able to Keep Your In-House Employees Motivated.
- 8) Staffing Issues Are Eliminated.
- 9) Precisely Meet the the expectations of the customer
- 10) Schedule Flexibility.
- 11) Reduced Environmental Impact.
- 12) Real Estate Savings.
- 13) Improved productivity.
- 14) Improved flexibility.
- 15) Omni-Channel presence.



10. Future Work

We are committed to carrying the Capstone project beyond the scope of term 3. This Project has given us hands-on experience about plethora of cloud services and has given us tremendous knowledge that we have gained and will transform us into Confident and skillful professionals in the Information technology domain. We as a Team are keen to carry forward this Project:

- We are planning to deploy more resources onto our NextGen Cloud and add a greater number of agents as part of our future work for the capstone project.
- The Team at NextGen Cloud is passionate about cloud computing and would like to deploy the NextGen Cloud across multiple cloud platforms including Microsoft Azure, Google Cloud Platform (GCP), Oracle cloud and IBM Cloud.
- Additionally, we would like to use a greater number of paid services on the Amazon Web Services (AWS) platform including making our website available on the HA Architecture.
- Due to our Omni-Channel presence, we are willing to try multiple analytics across different cloud platforms.
- In an era of marketing and advertisement, we would like to integrate the NextGen Cloud platform into affiliate marketing and collaborate with companies like Rakuten Affiliate Network and Ebates to drive traffic onto our website.



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- [4] Set up your contact center https://docs.aws.amazon.com/connect/latest/adminguide/amazon-connect-contact-centers.html
- [5] Amazon EC2 + Google Analytics Integrations https://zapier.com/apps/amazon-ec2/integrations/google-analytics
- [6] Amazon Lex https://aws.amazon.com/lex/
- [7] Google Analytics https://analytics.google.com/analytics/web/
- [8] Google Tag Management https://www.orbitmedia.com/blog/what-is-google-tag-manager-and-why-use-it/
- [9] Design a Website https://www.websitebuilderexpert.com/designing-websites/
- [10] Design a mobile Application https://99designs.ca/blog/web-digital/how-to-design-an-app/