An analysis of why a medical centre should switch to cloud-based services?

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Keywords—component, formatting, style, styling, insert (key words)

# Acronyms

|  |  |
| --- | --- |
| AWS | Amazon Web Services |
| EC2 | Amazon Elastic Compute Cloud |
| S3 | Amazon Simple Storage Service |
| 3CX | Developer of VoIP IPBX software on a global scale. |
| VoIP | Voice over Internet Protocol |
| IPBX | Internet Protocol private Branch Exchange |
| DB | Database |
| VPN | Virtual Private Network |
| GP | General Practitioner |
| NoSQL | Non-relational (database) |
| SaaS | Software-as-a-Services |

# Introduction

This template, modified in MS Word 2007 and saved as a “Word 97-

# Description of company

Walkinstown Medical Centre, located in Dublin 12, provides these services: GP, nurse, and chiropodist. [1] [2]

There are currently three doctors, two nurses, two chiropodists and two receptionists working at any given time. All documents and files are typed and printed and kept in a file folder on premises. This includes all schedules for patients, patient files, medication lists and vaccine information. All prescriptions are hand-written by a doctor. They are also using a standard phone system, so a lot of the time, a caller would receive an engaged tone. [1] [2]

This consumes a lot of time for both staff and patients which could be used for other services and assisting with patients on a faster basis. Walkinstown Medical Centre is currently not using any temperature devices for checking for COVID before entering the premises.

To keep all the services simplistic, AWS will mostly be used to demonstrate cloud-based services. Another cloud-based platform like Microsoft Aure, Google Cloud and IBM Cloud could all be used instead.

To move to a cloud-based system, Walkinstown Medical Centre should consider these services:

#### **Amazon Lex**

Amazon Lex is a service that allows a developer to create applications that use text or voice commands to act on behalf of a user. A bot does these actions (intents). It uses the same technology that drives Amazon Alexa. An example of this is where a bot could order a pizza. Parameters or “slots” can also be added such as a date and time, thin pizza, add pepperoni, no cheese, and so on. [3]

Amazon Lex will be used to create the appointment system for Walkinstown Medical Centre.

#### **Debian 10 Buster image and 3CX**

3CX is a phone system that can be installed on a Linux machine, in this case a Debian machine. With 3CX, one can have many extension numbers for their business, as well as automated caller prompts, voicemail, out-of-office greetings, SMS, live chat, and video calls, to name a few features. It also provides a variety of related services. 3CX can be used with a smartphone, PC, or a traditional landline. [4]

If one is using AWS, to get started with 3CX, one will need a Debian 10 Buster license from the AWS Marketplace. After that, it's a simple matter of setting up 3CX as 3CX does most of the work. There are numerous tutorials available on the internet. [5]

#### **Amazon DynamoDB and S3**

Amazon DynamoDB is a NOSQL database service that can be used with AWS. DynamoDB is named after Dynamo and features a data concept that is similar to Dynamo, but it is implemented differently. [6]

S3 is a scalable storage infrastructure from AWS. Amazon.com's global e-commerce network runs on the same infrastructure. S3 can store any sort of item, making it ideal for Internet application storage, backup and recovery, disaster recovery, data archives, analytics data lakes, and hybrid cloud storage. S3 Buckets are a resource that contains objects. [7]

DynmaoDB and S3 will be used to manage the likes of patient accounts, medical lists, vaccine records, scanned and uploaded documents as well as store a copy of prescriptions given to patients.

#### **Amazon Rekognition**

Amazon Rekognition is a computer vision system that was released in 2016 as a cloud-based SaaS. It is used to recognise faces and their facial expressions, check if one is wearing personal protective equipment, add labels, and many more features. Many government agencies in the USA use Rekognition, such as US Immigration and Customs Enforcement and Orlando police in Florida. [8] [9]

An Android tablet with an app will be using Amazon Rekognition to detect a person’s face and to gauge their temperature. [10] It will be placed in a custom-made stand in the porch area of the centre. Future developments could open the main door only when the temperature reading is within a certain limit. This would prove beneficial during the COVID pandemic.

#### **Amazon EC2 instance with a OpenVPN service**

OpenVPN is a VPN system that includes ways for creating secure point-to-point or site-to-site connections in routed or bridged configurations, as well as remote access. It can execute both client and server applications. [10]

One can set up OpenVPN with an EC2 instance by going to the Amazon Marketplace and following a tutorial, which can be found online. [11]

## Functional Requirements

### Requirement 1: Create appointment

#### Description & Priority

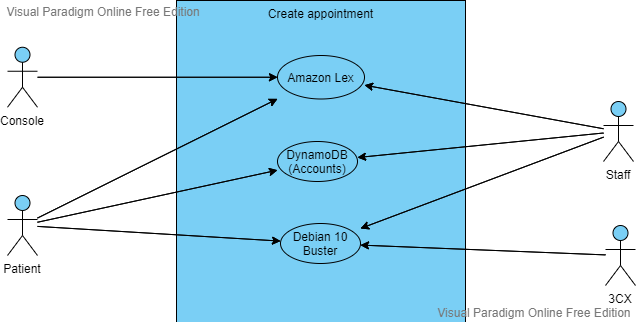
This requirement handles the appointments of patients who are visiting Walkinstown Medical Centre. This is the most important requirement as this would free up a lot of the staff’s time.

#### Use Case

**Unique ID:** create-appt

**Scope:** The scope of this requirement is to detail how a patient can create an appointment.

**Use Case Diagram:**

****

(Larger image in Appendix)

**Flow Description**

**Precondition**

* AWS is active and working correctly
* AWS’ relevant EC2 instances are active and running
* The patient’s device has access to Walkinstown Medical Centre’s website
* The Console (an Android tablet), where a patient check-in on premises, is connected to the Internet and Amazon Lex.

**Activation**

This use case begins when a patient navigates to book an appointment on Walkinstown Medical Centre’s website.

**Main flow**

1. The patient opens the website to the “Book an appointment” page. <See A1>
2. The patient selects the relevant service they require (GP, nurse, or chiropodist)
3. The patient selects a date and time they wish to book for.
4. The System checks with Amazon Lex to see if the appointment date and time are available
5. The System notifies the patient the date and time selected are available. <See A2>
6. The patient fills in their details
7. The System checks with DynamoDB if the patient already exists in the System. <See A3>
8. The System confirms the appointment and sends an email to the patient.

<Later at date and time of appointment>

1. Patient arrives at Walkinstown Medical Centre
2. Patient taps on Console to activate it.
3. Patient enters their date of birth and gender.
4. The Console checks with Amazon Lex if appointment exists <See A4>
5. The patient waits for service (doctor, nurse, or chiropodist)

**Alternative flow**

**<A1: Patient phones centre>**

1. The patient accesses the 3CX service by phoning Walkinstown Medical Centre.
2. The patient presses 1 to book an appointment.

<Returns to step 2 in Main flow, except voice commands prompt the patient>

**<A2: Selected date and time unavailable>**

1. The system notifies the patient the date and time are unavailable.

<Returns to step 3 in Main flow>

**<A3: Patient is not registered with centre>**

1. The System notifies the patient that they are not registered with the centre and requests the patient to phone to continue.

<Use Case ends>

**<A4: Console cannot find appointment>**

1. The Console notifies the patient the appointment cannot be found and to consult with reception

<Use Case ends>

**Termination**

This use case ends when a patient has successfully booked an appointment and is waiting to be seen by a service on-premises.

**Post condition**

This system goes into a wait state.

### Requirement 2: Phone system with 3CX

#### Description & Priority

This requirement manages

#### Use Case

**Unique ID:** create-appt

**Scope:** The scope of this requirement is to detail how a patient can create an appointment.

**Use Case Diagram:**

**Diagram

Description automatically generated**

(Larger image in Appendix)

**Flow Description**

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# Conclusion

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# Appendix

