**What is Data integrity, and How Can You Maintain it?**

Data Integrity in its simplest form can be thought of as the reliability and trustworthiness of data over its entire lifecycle, from the moment it is generated or collected, transferred, stored, backed up, archived, or used in performing analysis. Data Integrity answers the question of whether data is accurate, consistent, and can be trusted.

Data Integrity can be used to describe the state of your data, is it valid or invalid, accurate or inaccurate. It can also be used to describe the processes through which you try to attain Data Integrity for your data such as data validation, error checking, outlier detection, etc.

Data is said to have Integrity if it can be shown that the contents of that data have not been corrupted or compromised whether through a mistake as in the case of human error or maliciously updated as in case of a data breach such as a ransomware attack.

Data Integrity usually goes hand in glove with **Data Security**. Data Security refers to the **protection** of data against unauthorized access or corruption. Data Integrity is to maintain the overall consistency and reliability of data.

In the event of an unauthorized change in data, a system that adheres to the standards of Data Integrity should be able to answer questions such as which data changed, who changed the data, when was the data changed, what permission level was required to change the data, etc. The entire role of Data Integrity is to ensure that records are not corrupted during the entire period they are in existence.

Common reasons why data integrity may be compromised include formatting errors, [syntax errors](https://www.techopedia.com/definition/13391/syntax-error), Human error(duplicate or delete data), Transfer errors from one device to another( In a relational database, transfer errors occur when a piece of data is present in the destination table but not in the source table.), Bugs, viruses/malware, hacking, and other cyber threats, Compromised hardware, such as a device or disk crash.

Data integrity is enforced in both [hierarchical](https://www.techopedia.com/definition/19782/hierarchical-database) and [relational database](https://www.techopedia.com/definition/1234/relational-database-rdb) models. Integrity is usually imposed during the database design phase through the use of standard procedures and rules. It is maintained through the use of various error-checking methods and validation procedures.

**For databases, there are 2 types of data integrity:**

**Physical Integrity:**

* Safeguarding of data’s completeness and accuracy during storage and retrieval. Common threats to compromising physical integrity include natural disasters, disruption to database functions, human error or power disruption.

### Logical integrity

The logical integrity of data validates whether data is correct and accurate in these four specific contexts:

#### Entity integrity : To ensure that data isn’t listed more than once and that no field in a database is null, entity integrity relies on the generation of primary keys - The rule states that every table must have its own primary key and that each has to be unique and not null. Eg: Unique employee ID.

#### Referential Integrity : Foreign keys in a database is a second table that can refer to a primary key table within the database. Foreign keys relate data that could be shared or null. For instance, employees could share the same role or work in the same department.

1. Domain Integrity: A domain is a set of permitted values that a column can hold. For Eg: If a database allows values like dollars and cents, three decimal places will not be allowed.

#### User-Defines Integrity: It refers to the rules and limitations that the user creates to meet their own requirements. Business rules must frequently be considered and included in data integrity safeguards.

#### The following steps can simply be taken to reduce or remove data integrity risks:

* Limiting data access and modifying permissions to prevent unauthorized users from making changes to data
* Validating data, both when it’s collected and when it’s utilized, to ensure that it’s accurate.
* Using logs to keep track of when data is added, edited, or deleted is a good way to back up data.
* Internal audits are carried out on a regular basis. In the event of a data breach, it is vital to know the source of the breach, the documents or data that may have been accessed, and how the breach was possible.
* Access to data should be tightly regulated to ensure that only those with the proper authorizations have access to data. Broad access such as administrative rights for entire systems should always exist. Instead, employees should have access to only data that enable them to perform their specific job roles. Data should be isolated so that incidences of unauthorized access will be reduced.
* Having regular, reliable, and timely backup of data systems is essential to ensure that data can be recovered in the event of data loss.
* The security of systems that contain your data should be checked regularly. Software patches should be installed in a timely fashion.
* The employees in your organization should be trained to always maintain the integrity of data in all work processes.

**Explain asynchronous programming**

By default, JavaScript is an asynchronous, single threaded programming language. This means that instructions can only run one after another, and not in parallel.

let a = 1;let b = 2;let sum = a + b;console.log(sum)

The above code sums two numbers and then logs the sum to the browser console. The interpreter executes these instructions one after another in that order until it is done.

But this method comes along with disadvantages. Say we wanted to fetch some large amount of data from a database and then display it on our interface. When the interpreter reacianxiousnstruction that fetches this data, the rest of the code is blocked from executing until the data has been fetched and returned.

Now you might say that the data to be fetched isn't that large and it won't take any noticeable time. Imagine that you have to fetch data at multiple different points. This delay doesn't sound like something users would want to come across.Luckily for us, the problems with synchronous JavaScript were addressed by introducing asynchronous JavaScript.

Think of asynchronous code as code that can start now, and finish its execution later. When JavaScript is running asynchronously, the instructions are not necessarily executed one after the other.

We can classify most asynchronous JavaScript operations as

1. **Browser API/Web API** events or functions. These include methods like setTimeout, or event handlers like click, mouse over, scroll, and many more.
2. **Promises** and Async and await

Browser APIs like **setTimeout** and event handlers rely on **callback** functions. A callback is a function that is to be executed after another function has finished executing.

It is a function passed into another function as an argument to be executed later.

The function that takes a callback function as an argument is known as a High-Order function.

Callbacks are a way to make sure a certain code doesn’t execute until the [[1]](#footnote-0)other code has already finished execution.

The setTimeout function executes a function after a certain amount of time has elapsed.

The setTimeout is a JavaScript function that takes two parameters. The first parameter is another function, and the second is the time after which that function should be executed in milliseconds.

**Promise**

You can create a promise using the Promise constructor. You need to pass an executor function to it.The Promise constructor takes a function called executor as an input. The executor functions expect two parameters( here resolve and reject).

In case the asynchronous code has been executed successfully we’re calling *resolve*. This makes the promise state to be **resolved** and executes the code inside the **then** **block**.

In case of errors, we’re calling the *reject* function. This makes the promise state to be **rejected** and executes the code inside the **catch block**.

The finally block is called when the promise is settled(either resolved/rejected).

const promise = new Promise((resolve, reject) =>

resolve('I am a resolved promise');

);

You use promises every time you use the fetch() method to get some data from a store.

**Async/Await**

The async and await keywords enable asynchronous, promise-based behavior to be written in a cleaner style, avoiding the need to explicitly configure promise chains.

Async functions always return a **promise**. If the return value of an async function is not explicitly a promise, it will be implicitly wrapped in a promise.

*async function foo()*

*{ return 1}*

*//The above function works same as the below*

*function foo()*

*{ return Promise.resolve(1) }*

Async functions can contain zero or more await expressions.

The await keyword is only valid inside async functions. If you use it outside of an async function’s body, you will get a SyntaxError.

The keyword await makes JavaScript wait until that promise settles and returns its result.

If the promise is fulfilled, it continues the execution.

If the Promise is rejected, the await expression throws the rejected value.

We should always make sure that we write the await expression inside the try-catch block so that the rejected values are caught.

**What is an abstract class?**

A class which is declared with the abstract keyword is known as an abstract class in Java. It can have abstract and non-abstract methods.

Abstraction is a process of hiding the implementation details and showing only functionality to the user.

Another way, it shows only essential things to the user and hides the internal details, for example, sending SMS where you type the text and send the message. You don't know the internal processing about the message delivery.

* It cannot be instantiated (An instance of an abstract class can not be created)
* It can have constructors and static methods also.
* An abstract is a java modifier applicable for classes and methods in java but not for Variables( we can have abstract classes and methods but not variables).
* We can have an abstract class without any abstract method.
* There can be a final method in abstract class but any abstract method in class(abstract class) can not be declared as final or in simpler terms final method can not be abstract itself as it will yield an error: “Illegal combination of modifiers: abstract and final”
* If a class contains at least one abstract method then compulsory should declare a class as abstract
* If the Child class is unable to provide implementation to all abstract methods of the Parent class then we should declare that Child class as abstract so that the next level Child class should provide implementation to the remaining abstract method.

**How do you address resistance to change? Change in requirements.**

We can reduce resistance by simply communicating more frequently so that the misunderstandings between both sides of the employees and the management may be reduced. We are using an application that helps us communicate more effectively and helps get more feedback through an employee survey, which is ConnectCo. After using this app, resistance was minimized tremendously.

It is important to first understand our employees and their specific reasons for the resistance to change.

Any major changes need to be handled carefully. Typically the most resistant are the ones that have helped build the company. The ones that have been there for a long time.

The best way I have managed this when experiencing growth was to properly communicate. Every employee needs to feel secure in their positions and know that there may be more opportunity for them. They also need to be fully trained on new processes or procedures, especially ones directly related to their jobs. It's important to get them on board and more effective if they are able to provide input on the changes.

When someone is comfortable and feels confident in their ability, any kind of changes can impede that. It's imperative for us to know we are part of the growth and we want to continue to be a part of that growth.

My coworker has been with the company for 20+ years, several have been there for a long time. Her ability is tremendous but she is not confident as a person so my first step was to build her confidence by acknowledging her accomplishments and setting her up for success by including her in changes to the processes. I've taken the time to ensure she is comfortable with the changes and the ones she doesn't feel comfortable with. I encourage her to try explaining there's going to come a point where she doesn't have a choice. So far she has come leaps and bounds and has been a force to improve structure. It did take a lot of coaxing and I'm confident she will continue to be on board. It hasn't been easy. It's been downright frustrating at times. Since I started though I've been very clear and straightforward about the goals and what we need to do to reach them. I've also made it very clear that we are a team and can't reach the company goals without everyone being a part of it. She is an asset and she knows this which is really the most vital part of implementing changes. Those involved need to feel like they are a part of the changes and that the changes are a good thing.

**What tools/techniques have you used in your projects to capture requirements?**

Requirements are usually gathered by interviewing the client and asking specific questions to get a feel of how a process is carried out.

Collecting requirements is an iterative process which is done in several cycles. I will start discussing the high-level requirements with the client:

What does the client want?

* What are Client expectations?
* What does the client want to achieve with the project/product?
* What other solutions has the client tried before?
* Which ones worked and which ones didn’t work? Why have they not worked?

The way I carry out the initial, high-level requirement gathering is just in a number of casual meetings and by careful note taking.

Then I dig deeper into each requirement until I have a very clear understanding. To conduct a more in-depth analysis of each requirement, you typically use a more formal process for requirements gathering.

This can involve process flows, product prototypes, simulations and other methods for requirements analysis.

## My best methods for understanding requirements are:

### METHOD 1: CREATE A QUESTIONNAIRE

In my projects, I’d always send out a large questionnaire to the customer first. It covered all the questions we knew were important in order to figure out the project scope, effort and cost. The questionnaire was a Word document of several pages, containing very specific questions and directions. Here’s an example of a question

Question: Which functions or features are *necessary* to have versus *nice* to have?

Question: What is the most important information your site must relay to the user, especially on the home page?

Question: Timelines

We gave the customer 4-6 weeks to complete it and send it back to us along with the additional pieces of information we requested, like document samples, Excel analyses and the like.

How did we know what questions to ask?

I sat down with every team member to collect the questions they needed an answer on, so that they were able to complete their work package.

Also, we added questions we knew were essential based on our experience from previous projects. We held a lessons learned workshop after every completed project in order to look back at what had worked and what didn’t go well. Our findings were used in upcoming projects.

### METHOD 2: VISUALIZE THE CLIENT’S PROCESSES

Visualizing is a powerful way for understanding requirements. That’s because visual information is much easier to process for the brain than mental concepts.

I will ask the client to draw a process flowchart in case I want to understand a specific process. Or you can ask the client to give you samples of his favorite designs so you get an idea of your client’s design preferences. Bị

We used visualization extensively in our projects, and it proved to be super helpful especially when we talked about processes that were new for the project team.

### METHOD 3: THE REQUIREMENTS REVIEW MEETING

Any high-level requirements gathering you do at the beginning of your project must be followed by an in-depth look at each requirement. I call this a detailed requirements review.

We go into a detailed requirements review typically after we’ve received the requirements questionnaire back from the customer.

To give you an impression of what the discussion typically goes like:

Let’s assume we are rolling out a new IT system for the client. And we agreed to transfer old data to the new system so that the client can get started right away.

Looking further into the requirement to transfer data to the new system, we would ask questions like the following:

* How many data records do you have in total?
* Can you show us samples of your data?
* What format do you store your data in?
* Do you have a process / tool for extracting the data?

Then we wouldn’t just ask those questions, but we’d look at actual data that the customer provided us. And then we would dig deeper, with more specific questions. And so on 🙂

### METHOD 4: CREATE A PROTOTYPE

### Giving the customer a prototype not only allows them to get a “feel” for the product. It also helps to derive the desired features and requirements.

### After seeing the prototype they have a much better understanding of how the software should be customized for their needs.

### Instead of starting right away with coding a software, you could give the client an Excel prototype of the desired solution. He can work with the Excel file for a couple of days and thereby really understand what additional features he wants or needs.

### The great thing about this approach is that you significantly reduce the risk of your project because the chances of having missed a feature is much lower.

## Qualifying requirements

If you have no rules or process in place to help you decide which requirement is really needed and which one is not, you might as well say good-bye to a successful project.

When you ask your client which of the features he wants for his machine, software or service, he will typically say: I WANT IT ALL, I WANT IT NOW. But normally you can’t implement all features right away

That’s why you need a way to decide:

* which requirement is an absolute must
* which requirement is needed but not urgent
* which requirement is a nice-to-have

Use a ranking strategy like A=must, B=needed not urgent, C=nice to have and have all the requirements ranked by the customer.

Assign an ID to every requirement

It’s easy to get confused when you have to manage hundreds of requirements. I will put every requirement into an Excel sheet and give it a unique number. This simplifies communication with the customer and the team and helps to avoid ambiguity or even misunderstandings.

Get requirements signed off

Once I have collected and documented all requirements, get the customer’s signature for approval.

## Tools For Gathering Requirements

It is important to have the right set of tools to gather the requirements effectively

1. Microsoft Tools like Excel & Word
2. Jira
3. Confluence

We create a context diagram for the system. The system is put in the middle of the diagram, and the interaction between customers, end-users, suppliers, and stakeholders is identified.

Use Case Diagram: Use Case Diagram helps to understand the interaction between the user and the system where each user is called an actor and processes/functions are available in the diagram.

Sequence Diagram: This shows the interactions between objects over some time. The objects here can be actors or systems within the systems. It provides a top-to-bottom view of where the messages are being delivered to and from between objects.

User Stories: It is a general explanation of a product feature written from the end-user’s perspective. It helps understand how the feature will offer value to the customer.

## Tips for Writing a Requirements Document as a Business Analyst

Here are the following things your document should have to understand the project requirement more clearly:

1. Name of the Project
2. Project Goals & Objective (What the client wants and why they want it)
3. Scope of the Project( define the work that needs to happen to complete the project)
4. Stakeholders- (Individuals who are impacted by the project outcome & who make informed decisions in every step of the project).
5. Project Deliverables (end product or service you will create for the client)
6. Project Timeline- (Approximate time needed to complete the project)
7. Business Requirements- (any specific requests defining the business objectives)
8. System/Technical Requirements-( softwares/items needed to build the UI/interface/deliverables)
9. Approximate budget- ( As mentioned by the client)
10. Resources for the project- ( identifying the project team who can help deliver the project according to skill sets)
11. Identifying the success criteria-(How successful was the project in meeting the project goals)

**Explain your experience of working in a technical project where you led requirements**

**Gathering.**

I worked for a Client called AT&T and Mercedes Benz which was involved in Web Application development. The team in which I work includes a variety of software developers from different technologies like .NET, PHP, Java, Front end - Javascript, angular, CSS, HTML , Sharepoint, Salesforce etc.

My Experience:

* So basically, we get requirements for web application development from our client who is AT&T and Mercedes Benz.
* We analyze the requirements of the clients and also forward the requirements to the concerned team lead based on the requirement and technology.
* If the information provided is not enough then I would create an Understanding and Queries document. And also request clients to connect for meetings, so that requirements can be discussed in detail.
* Understanding and Queries document helps us and client in figuring out that both the parties are on the same page in understanding what exactly the requirement is.
* Once it is clear, then I would work on the Scope of Work document.
* Scope of Work document details out the Objective of the requirement and features/modules that will be included in the system.
  + For example, if we get a requirement of making a mobile app (iOS and Android). Then we will detail out the objective of the mobile app that will answer What, Why and How questions.
  + Then we will include the features/modules that are required in the mobile app like Sign up screen, login screen, Forgot password screen, settings screen, admin login screen, admin management, screen based on app specific requirements etc.
* Scope of Work document will include the estimate breakdown, which will specify how much time it will take to complete the app/website.
* Document will also include the other services that company provides like SEO, A/B testing etc.
* The technical team responsible for developing the system creates a WBS (Work Breakdown Structure) sheet. This sheet contains the feature/module name and time it will take to complete it.
* Scope of work document and WBS are then discussed internally in the team including Team Lead, Developers, QA and Business Analyst.
* This document is sent to the client via official mail.
* Once a client approves the Scope of work document lead gets converted to a working project. I will start preparing a Software Requirement Specification (SRS) document.
* This document details all the technical requirements, features and modules of the project.
* SRS is provided to clients for review and approval.
* Then I would organize a Kick off meeting with the client and development team to start the project.
* The whole project is developed under Agile Methodology. So, the complete project is delivered in Sprint plans. Ideally we make a two weeks sprint.
* Whole project is divided into requirement modules and requirement modules are further subdivided into tasks.
* I would manage the whole project in the project management tool used.
* I would take weekly meetings with clients and the development team to get updates on the status of the project. And daily stand up meetings
* I would perform the UAT testing and check that there are no major failures in the system.
* Once a project is completed, it is delivered to the client and then I would conduct the Sprint Retrospective Meeting - Understand the learning out of the process and Identify what went well.
* In the end, I will prepare a Closure Report based on the project overall health and client’s feedback.

### Business requirements

These include high-level statements of goals, objectives, and needs. [Business requirements](https://www.altexsoft.com/blog/business-requirements-document/) do not include any details or specific features. They just state the problem and the business objective to be achieved

* Functional requirements define what a product must do, what its features and functions are.
* Nonfunctional requirements describe the general properties of a system. They are also known as *quality attributes*.

Eg : In the online banking system a business requirement could be “As a user, I should be able to get cash transaction statement” or The customer must place an order

Non-functional - All web pages should be able to load within three seconds.

**Do you have leadership/project management experience? What tools/processes have you used in such a role?**

Process - Waterfall and Agile, Scrum

In my last role as a business analyst, I used Microsoft Project for all of my projects. The program was easy to navigate and helped me stay organized by creating tasks, setting deadlines and tracking progress on each task. I also found it helpful to create Gantt charts to see the entire project at once and break down each part into smaller tasks. This allowed me to communicate effectively with other team members about their responsibilities and when they needed to be completed.

It’s very easy to align your project team and make sure everyone is on the same page. Depending on the size of your team, project complexity and intensity, you may want to have one project management team with channels representing different projects, or a team per project.

We will have channel conversations for internal collaboration.You can also upload all your project documentation to the Files tab of each channel to make sure all your key information is stored in one location.

We can organize all tasks and monitor the progress. [Tasks in Teams](https://techcommunity.microsoft.com/t5/microsoft-365-blog/connecting-tasks-experiences-across-microsoft-365/ba-p/1522069) combines tasks from To Do, Planner, Outlook, and Office (Word, Excel, and PowerPoint), allowing teams to manage their work in one place.

With Microsoft Team you can manage meetings and use video calls from your computer or mobile phone. Moreover, you can have a one-on-one or group video call from a chat even without hosting a team meeting.

Can be used for Document storage

I have also Used JIRA and Confluences for managing the requirements and documents. While JIRA is ideal for tasks, Confluence is better at capturing text and content. We used JIRA to track all sprints, features, bug reports and requests of any kind with an “issue number.” Documents resulting from activities such as early analysis, requirement gathering, design and customer interviews should be kept in Confluence.

We will have workflow in JIRA for every issue or epic or defect - > open, in progress ,resolved, reopened or closed.

For each project, exactly one Jira project and one Confluence area should be created. Thus, all project participants have a “single source of information” and do not have to search for distributed information in countless documents or Doors modules, for example.

Each [requirement](https://t2informatik.de/en/smartpedia/requirement/) or user story is represented by a process in Jira. A standard process in Jira has an ID, a title, a status, a description and the possibility to add screenshots or other attachments. There is also a comment function for each operation that allows users to add comments to the operation. If further information is necessary to understand the request, it is stored on a Confluence page belonging to the request.

Many teams will start off with kick-off planning in Confluence, where you can take advantage of page templates like Project Plan, Meeting Notes, or DACI, tag everyone involved in the meeting, and start noting tasks, deadlines, and action items.

From there, you can create Jira issues for the tasks that need to be done and assign them. We can track and share progress of the various tasks by using a filter to display all the issues related to the project on a Confluence page. Confluence is full of materials that provide a valuable context for your team during the sprint (designs, tech specs, customer research, requirements documents, and more). Link these pages to epics and you will make them all accessible for your team during the sprint. With Jira Core dashboards, you can get a high level view of the whole project.

The Process which we used for the project is Waterfall, Agile and Scrum.

Each sprint goes through the following phases:

* First, the [product owner](https://asana.com/resources/product-owner) organizes the [product backlog](https://asana.com/resources/product-backlog). The product backlog is a list of every task that may be worked on during the sprint. This information is usually stored in a [project management tool](https://asana.com/uses/project-management).
* Before the sprint, the entire project team participates in [sprint planning](https://asana.com/templates/for/engineering/sprint-planning) to identify the best tasks to work on during the two-week period.
* During the sprint, Agile teams meet frequently to discuss blockers and action items.
* Once the sprint is over, team members get together to run a [sprint retrospective](https://asana.com/templates/for/engineering/sprint-retro) and identify what went well and what could have been better.

The Scrum master is responsible for implementing the three traditional Scrum phases:

* Phase 1: [Sprint planning](https://asana.com/templates/for/product/sprint-planning). A Scrum sprint is usually two weeks long, though teams can run faster or shorter sprints. During the sprint planning phase, the Scrum master and team take a look at the team’s [product backlog](https://asana.com/resources/product-backlog) and select work to accomplish during the sprint called sprint backlog. The team decides how to implement the sprint backlog within the time frame of the sprint. .
* Phase 2: [Daily Scrum standups](https://asana.com/templates/for/product/agile-daily-standup). Over the course of the Scrum (also known as the Scrum “cycle time”), teams traditionally meet for 15 minutes every day to check in on progress and make sure the amount of assigned work is appropriate.
* Phase 3: [Sprint review and retrospective](https://asana.com/templates/for/product/sprint-retro). When the Scrum is over, the Scrum master hosts a sprint retrospective meeting to evaluate what work was done, route any unfinished work back into the backlog, and prepare for the next sprint.
* As the next sprint begins, the team chooses another chunk of the product backlog and begins working again.

***6* you joined a new project that used a technology**

**and software that you were not familiar with? What are the challenges you**

**faced and how did you overcome them?**

I used to work for Mercedes when I joined Accenture and I moved to a different project and for a different client where everything is related to cloud services and everything was challenging. Later on I started taking some courses regarding AWS cloud and learned the basics of the services that I have been part of. From then everything started making sense and I was finally able to understand the tech stack and the business needs and be able to suggest what services we need for the project. Earlier when we used to work for mercedes benz in accenture whenever we need to deploy something some new code we used to login into servers and deploy the code and we used to manually restart the web server and app server and later on i moved to a different project in accenture where everything is cloud all the services that we are using everything is deployed in cloud and everything is containerised so, the process we deploy here in new project is completely different from what i used to do. Here there is no need to restart the servers or no need to login the server and deploy the app manually. Everything is automated so we still need to login into clusters and deploy something but the process is completely different from what we used to do. The code is completely docker containerised and all the services are running as pods in kubernetes clusters and when it comes to storage we started using S3 in AWS and all db are completely in cloud (dynamo DB, RDS) so everything is like in cloud. The transition was initially a bit challenging because everything is new and I am not completely used to what the current stack that they are using but later now I started comparing the cloud services with the one which we have on prime. We have db on prime but we have rdbms, dynamo db we have no sql, sq, we have cassandra and multiple dbs on cloud. In the same way we used to have it on prime and also in cloud as well. But understanding, it took some time to understand the whole transition but later everything started making sense to me and then even when it came to deployment earlier we used to login to server, pull code, restarted the server and web app. Coming to the cloud environment everything is docker containerised and we use kubernetes orchestration so that no need to login into server and restart the servers all we need to deploy the new image with the newer version of code. That transition took some time but I overcame that.

**Explain your experience in UAT, working with Development/QA/support teams? have you**

**been involved in any troubleshooting of technical issues?**

There were scenarios where our web app performance was very slow. So when the user is trying to load the page it used to take a lot of time to reload the page, reload the entire page. So initially we were troubleshooting the issue and we are not seeing any issue in QA or in the lower environment. When it was in the UAT, we had faced this issue where, user is trying to load the page and it is taking a while to completely load the page. So, later on we realized that there are multiple JSON and multiple JavaScript and multiple CSS files. We used the BootStrap framework, and there were like so many files and it took so much time to load all the JS files and CSS files.

That is the reason to load the complete page, it has to load all the JS files and CSS files. Uh, so it took a while for us to figure out why this is taking so much time. And then we finally went with a solution by using CDN which is a Content Delivery Network. So basically we started like instead of dumping all the files we started using CDNs whenever there is a JavaScript file or the CSS file.

So basically when a user request for a JavaScript file or the CSS file so for the first time it will try to load or it will try to extract all the files and for the next request, whenever there is a similar kind of request, it will take it from the cache so it won't directly hit the server again and again so that the performance of the web application started improving. That is one issue we faced before. There is also another issue with the database whenever we test something in qa there will be few permissions and we will grant those permissions in qa we will forget to grant those permissions in UAT and in the higher environments.

So after deploying everything into uat we will sometimes realize, okay, we didn't apply those changes in UAT and we didn't apply those changes in prod. And you know, by the time after we deploy something in uat, we will realize, oh, oh, we didn't apply those changes in uat, and that's when you know, issues with the permissions by granting permissions to dynamo db by granting permissions to different databases things like that. Not just with the permissions, but we also face some similar kinds of issues with the network connectivity as well. You know, whenever in QA we used to have the network connectivity by openings, you know, by granting the port or by allowing certain port and also making sure that the cluster or the service is able to talk to the database just by checking the network connectivity, whether, the connection is peered(established) or not. So things like this there are high chances we might miss these peering connections in between, there were scenarios where we might have missed these the permission issues or peering, the connectivity issues or something related to cdn. And so these were the cases where we faced these issues. But, you know, we were able to come up with the solution.

***Describe your experience designing, developing or building solutions that need to interface to both legacy and new technology systems.***

We used to have this existing application called SalesExpress when I worked for Client AT&T, where that application has been there for almost like 10 years and then we tried to introduce something new called DMS which is nothing but a file generation service where users can actually log in and generate a form and sign everything online. Until then legacy applications used to work in such a way that the form had to be printed and then signed on the paper, and then it had to be mailed to AT & T. But now this would let them do everything like sign all the forms online and mail automatically online. For us to do this, we had to incorporate this DMS service, this file signing service.

We named it DMS. That particular service has been installed on a separate environment, which is in the cloud and we establish a connectivity between that particular new technology that was developed to communicate with the legacy application that's already in another on-prem environment, which is now sitting in Azure. How can the new application talk to the old application? By, through this, uh, through the web service call on port 443 and the traffic can be reached to the Application using a regular call but we set up Web Seal ( Authentication ) to understand that this is a genuine call. So it gets processed through the web seal, hits the application and it works. We exchanged the SSL certificate because this new application has to access the old application. We added the new application SSL certificate into the old application and old applications into the new application. That way both of them communicate with each other.

**Please describe design patterns and their advantages. Please describe your experience with using 3 design patterns that you have used in your project along with the reason for using them.**

So basically we have used three design patterns in our project. So the first one is MVC architecture that is nothing but the model view controller. So in this pattern, basically whenever a user requests for a page or separate url, it will first initially hit the controller, So the controller is basically, which controls the request. So once the controller gets the request, we need to first validate the request. If there is any business logic that needs to be attached, we need to send that controller request to model. We will have the business logic and any update, create, delete, or any crud operations we will do that operation in the model. After, validating and after updating the records, we will get back the response from the model to controller again, and then redirect the page to a different page. Or, based on the response that we get from the model, we redirect the page or change the page and show that view to the user through, through view.

So this is how the model view controller works and coming to the other design pattern, which is singleton.

We have used the Singleton design pattern when a class in our program should have just a single instance available to all clients; for example, a single database object shared by different parts of the program.

Just like a global variable, the Singleton pattern lets you access some object from anywhere in the program. However, it also protects that instance from being overwritten by other code.

Suppose we have 3 different python files, In the first Python file we have a variable called xyz, and you have set that variable value as 1234. You want to use that 1234 everywhere in the project. That is like a kind of global variable, and you want to use it everywhere in your project. So in those cases, kind of cases instead of creating that variable again and again, in every project, in every Python file you just create that variable in the first Python file and import that file in the other two Python files and just call it like Python file [one.xyz](http://one.xyz/). We can access the variable. All we need is to import that file. That's how you can import those files in every other file without the use of creating them again and again. So that is the purpose of singleton.

Use the Factory Method when you don’t know beforehand the exact types and dependencies of the objects your code should work with.

Use the Factory Method when you want to provide users of your library or framework with a way to extend its internal components.

Use the Factory Method when you want to save system resources by reusing existing objects instead of rebuilding them each time.

Next design pattern which we used is the factory. Sometimes we may need to like, involve/write so much code. You know, you need to have like so many conditions and so many loops within the same program, right? So instead of complexing that, you can have one piece of code that can return the value and use that function whenever it's required. Instead of having that same logic in every method and making that program a bit more complex, you can have a single function and call that function. So that is like refactoring the code. So in a few cases, we may need to use so many if else conditions. So instead of all those, including all the if else conditions, and for loop conditions, in a one single program, use it in the proper efficient way. If there is a new functionality that needs to be added to the same logic. it'll be a tedious process where you need to find all over the program and you need to change it everywhere. So instead have that logic in a single class and try to inherit that class and use that method. So if there is a new functionality or new parameter that gets added you just need to change it in one single place and that will reflect in all, in every other place.

**What is Data Concurrency? How do you achieve data concurrency in a Web Application?**

A concurrency conflict occurs when one user tries to edit an entity's data, and then another user updates the same entity's data before the first user's change is written to the database. If you don't enable the detection of such conflicts, whoever updates the database last overwrites the other user's changes, thus leading to data loss.

Pessimistic Concurrency is a ‘seatbelt in your car’ approach – we assume that concurrency conflicts will happen and we believe they will happen often. It locks the database's record for update access and other users can only access the record as read-only or have to wait for a record to be ‘unlocked’. Programming an app with a pessimistic concurrency approach can be more complicated and complex in managing because of deadlocks’ risk.

For example, before you read a row from a database, you request a lock for read-only or for update access. If you lock a row for update access, no other users are allowed to lock the row either for read-only or update access, because they would get a copy of data that's in the process of being changed. If you lock a row for read-only access, others can also lock it for read-only access but not for update.

Managing locks has disadvantages. It can be complex to program. It requires significant database management resources, and it can cause performance problems as the number of users of an application increases (that is, it doesn't scale well). For these reasons, not all database management systems support pessimistic concurrency. The Entity Framework provides no built-in support for it.

The alternative to pessimistic concurrency is optimistic concurrency. Optimistic concurrency means allowing concurrency conflicts to happen, and then reacting appropriately if they do.

Optimistic concurrency assumes that the update being made will be accepted, but prior to the change being made in the database, the original values of the record are compared to the existing row in the database and if any changes are detected, a concurrency exception is raised. This is useful in situations where allowing one user's changes to overwrite another's could lead to data loss. This could happen for example, if two users are looking at a customer record, and one of the users adds a missing telephone number. The second user alters the address, but the record that they alter was retrieved before the telephone number was added by the first user. When the second user commits their change (which won't include the telephone number), the first change will be lost. Entity Framework Core provides support for optimistic concurrency management.

Entity Framework Core provides two approaches to detect concurrency:

configuring existing properties as concurrency tokens;

and adding an additional "rowversion" property to act as a concurrency token.

Properties can be configured as concurrency tokens via data annotations by applying the [ConcurrencyCheck attribute](https://www.learnentityframeworkcore.com/configuration/data-annotation-attributes/concurrencycheck-attribute): for existing properties in class we add attribute concurrencycheck

* public class Author
* {
* public int AuthorId { get; set; }
* public string FirstName { get; set; }
* [ConcurrencyCheck]
* public string LastName { get; set; }
* public ICollection<Book> Books { get; set; }
* }

Alternatively, properties can be configured using the Fluent API [IsConcurrencyToken method](https://www.learnentityframeworkcore.com/configuration/fluent-api/isconcurrencytoken-method):

* public class SampleContext : DbContext
* {
* public DbSet<Author> Authors { get; set; }
* protected override void OnModelCreating(ModelBuilder modelBuilder)
* {
* modelBuilder.Entity<Author>()
* .Property(a => a.LastName).IsConcurrencyToken();
* }
* }

Any existing properties that have been configured as concurrency tokens will be included with their original values in the WHERE clause of an UPDATE or DELETE statement. When the SQL command is executed, EF Core expects to find one row that matches the original values. If any of the configured columns have had their values changed between the time that the data was retrieved and the time that the changes are sent to the database, EF Core will throw a DbUpdateConcurrencyException with the message:

Database operation expected to affect 1 row(s) but actually affected 0 row(s). Data may have been modified or deleted since entities were loaded.

### Adding a RowVersion property

The second approach to concurrency management involves adding a column to the database table to store a version stamp for the row of data. In SQL Server we use the rowversion data type . The column stores an incrementing number. Each time the data is inserted or modified, the number increments.

User A might retrieve a row of data, followed by User B. The rowversion value for the row will be the same for both users. If User B submits changes, the rowversion value in the table will increment by 1 for that row. If User A subsequently tries to modify the same record, the rowversion value in their WHERE clause combined with the primary key value will no longer match an existing row in the database and EF Core will throw a DbUpdateConcurrencyException.

A property must be a byte array data type to be mapped to a rowversion column. Property can be configured to take part in concurrency checking by adding the TimeStamp data annotations attribute:

* public class Author
* {
* public int AuthorId { get; set; }
* public string FirstName { get; set; }
* public string LastName { get; set; }
* public ICollection<Book> Books { get; set; }
* [TimeStamp]
* public byte[] RowVersion { get; set; }
* }

If you prefer to use the Fluent API to configure the property, you will use the IsRowVersion method:

* public class SampleContext : DbContext
* {
* public DbSet<Author> Authors { get; set; }
* protected override void OnModelCreating(ModelBuilder modelBuilder)
* {
* modelBuilder.Entity<Author>()
* .Property(a => a.RowVersion).IsRowVersion();
* }
* }

The SaveChanges method should be called within a try-catch block so that any DbUpdateException exceptions can be caught and the appropriate action taken, such as presenting the newly updated record to the user.

**What is Dynamics 365 Plug-in? Please share your experience working with Plugins along with any challenges you faced and how you resolved them.**

Dynamics 365 brings all sales and customer data together into one system, offering users a single source of truth. This gives users a complete picture of their customers’ journey, helping them track customer journeys, generate and assess leads, and seize opportunities.Dynamics 365 is easy to integrate with other widely used Microsoft business products such as Outlook, Power BI, and Office.

Plugin is nothing but the custom business logic which we will write on dotnet framework

to extend or modify the standard behavior of the CRM. We need plugin because when we implement our business on the dynamics we will try to use maximum features but still there will be some requirements which will not be accomplished in that case we have to write our own custom logic to accomplish those features so for this reason we need plugin. We will develop the plug-in on the.net framework and then we build a DLL, register with the CRM and that's how it will be extending the feature of CRM and can also be done by Microsoft flows. Whenever we interact with records in CRM then we do some operations like we will create the records or modify the records or we will assign a record from one user to another users these operations we will be doing in CRM so when we do that then this will be called as events. These events will go through the web service of the CRM and when this event will occur then plugin will have messages for that so like when you're creating the record of the any entity then we have the create message to register the plugin when we are updating or deleting or assigning the record those messages will come into the plugins so those events are nothing but the messages for the plugin. We have two types of plug-in synchronous and asynchronous.

Synchronous plugins are those when the plugin will run and then it will freeze your page like the page you are interacting with until the entire code has been executed. If we have any error then it will break so that is the problem with the synchronous plug-in. When we use synchronous plugin load time and the execution time should be very small and if the logic is complicated and the code is lengthy then it may take lot of time and in that period of executing page will be freezed for such kind of operation when we don't want our page to get freeze and we want the task to run in the background we use asynchronous plugins which will run background. Whenever any event will take place CRM core operations will perform the task but before Core operation we have pre event and post-event. In Pre event we have 2 operations pre operation ( stage 10), pre validation ( stage 20) and in post event we have post operations ( stage 40). Any custom logic or plugin or workflow we write, it will be present in the DB or local system of CRM server we install, when we do any operation like create or update it will come as request to CRM web service, then it will go to the execution pipeline and there it will determine if its a pre event or post event. After the Pre event is performed like pre operation and pre validation then the core operation will do the changes to the db and after that post operation will be executed ( whatever post logic we have written). If the plugin is synchronous it will be executed immediately but if it is asynchronous then it will enter another queue called async queue and this async queue will have an async manager which will handle all the async events. In Pre-validation we don't access the db we cannot do any transaction but we can do validation of data. For example if we want to delete some record then we will check if that record exists or not. So we register such operations in pre validation.Pre operation, we can perform a db transaction when we create or update any record that will reflect in db also. So we have db access here and any data manipulation if we want to do before an actual event happens by CRM core operation we can do here. If we want a total number of records we will fetch the number of records from different services and assign the number to the target entity. When core operations will perform the task this will be set to the entity which we updated or created. Post operations are those which will run after core operations example : when we create a record after that we need other records we want to create and send some notification. We can do db transactions (CRUD operations).

**What is an Inline View in SQL?**

***Is it better to design the database tables by mapping the UI screens directly to***

***database tables or by designing the database tables and normalizing them***

***independently of the UI screens?***

***Normalization is the process of organizing data in a database.***

**I feel it is always good to design the table by normalizing them** independently of the UI screens because it is easy to map the tables to UI by using the following rules such as

1NF, 2NF until 5 NF. For eg: If we take a table that has a customer id and transaction, a customer can have multiple transactions and it is not a best practice to have all the transactions in a single column. Instead we divide the multiple transactions into multiple rows which is nothing but 1NF.

The main criteria of 2NF is it should obey 1NF and every non key attribute is fully dependent on the primary key. Let's say we have a table called student and have student id, name, prof name, prof id and grades. So let's say if the student leaves the university the entire row will be deleted and we lose the information of the professor because this attribute is dependent on primary key(student ID) so let's say if we have a separate table for student professor and grades the issue will be resolved.

Let's take 3NF For a table to be in the third normal form,

1. It should be in the Second Normal form.
2. And it should not have Transitive Dependency - When a non-prime attribute depends on other non-prime attributes rather than depending upon the prime attributes or primary key.

In this way we can organize the db table and map it to UI.

***Explain front-end development experience with JavaScript, Angular, html?***

***How would you debug a runtime JavaScript error on a website?***

I worked for a project called AT&T it is all about providing different network services. It's a web based application. So we have different microservices for FE and BE. For FE we used javascript then we migrated it to Angular. Angular is a single page application where we can build multiple components. Every view or page is one component. If a person is reloading that particular URL it will just reload the component, it will only change the component it will not change the whole page or it will not load the url again. In Angular we can have parent child relationships and We can communicate between 2 components using input output emitters and we can pass the values to html and we can take back values which we want dynamically. In css we have used scss. We can write logic eg if we want red color in the headers then we can declare that in the scss file. If we want to add some property like blue button then we can define in one variable that variable we can use across all the files. To improve the performance of the application we are fetching our images from cdn network. We were minifying all the js files and css files. We have worked on different device sizes also. Developed a responsive website by giving media queries @media width and height. We used to check the mockups and check if the development is as per the business needs. One page interacts with another page using component and child relationship in angular. To improve the performance we have implemented lazy loading, where we call the module based on need basis. Suppose we have 4 components we call whichever component is needed instead of calling everything.

If there are any errors then we can use console.log() to display JavaScript values in the debugger window.

## Setting Breakpoints

In the debugger window ( Source tab where all files load and display) , you can set breakpoints in the JavaScript code.

At each breakpoint, JavaScript will stop executing, and let you examine JavaScript values.

After examining values, you can resume the execution of code (typically with a play button).

Check the error in the Console window of dev tools.

***What are the key considerations of designing and developing public facing web applications?How do you maintain the security of the application and data?***

The UI should be responsive

Easy to understand easy navigation

Performance should be good. If we are fetching data from backend then the time should be minimal

Spinner should be there, the user should be knowing that something is happening in FE. We have to develop a spinner for every http request.

Content should be easy scrollable

Proper pagination should be there

Button and colors should be consistent there should not be any inconsistent

Results should load fast and properly

Suppose if we are in amazon website suppose in 5th page and 5th step suppose we selected electronic section and selected one laptop. When we click on the back button it should take us to the electronics page but not to the home page. Proper navigation should be. This time wastage will be reduced.

Performance should be fast.

It should be Compatibility with Multiple Browsers

Using Captcha Tests differentiate humans from robots and to prevent spam

Effective Security by adding SSL certificates to websites

Sitemap provides visitors and search engines with the information to easily navigate your website and discover its contents

Clean design

Effective Color Scheme

A friendly suggestion, such as “Contact us today!” demonstrates that your business wants to develop a relationship with its customers

Placing calls to action on your website encourages customers to contact your business.

Responsive, mobile-friendly design

Search engine optimization (SEO)

Structuring your site for scalability - we have to design in such a way that we can implement new features easily

Should follow WCAG - Perceivable: Visitors are aware of the content on your site.

Operable: The functionality of your website should be possible in different ways.

Understandable: All content and alerts can be easily understood.

Robust: Your website is usable across different assistive technologies, devices, and browsers.

Implement Role management: Basically any resource or any storage needs to be secured from the Users. The roles and the policies should be specific and confined to that particular user or service account who are accessing the storage.

Encrypt your data: Anything we are storing in storage should be encrypted by using keys and whoever has permission to access that key can only decrypt the data.

Perform regular application security Audit: track suspicious activity in logs and tracking end user actions.

Perform Penetration Testing: hands-on examination by a real person that tries to detect and exploit weaknesses in your system.

Firewall Rules: we can implement firewall rules by allowing only certain traffic and restrict any IP address and certain ports.

Exception Management: Proper error handle should be implemented. We would never want to display anything more than just a generic error.

***Describe your ability to work under tight deadlines***

***How would co-workers (Management or peers) describe your work ethic,***

***aptitude, and attitude as a professional?***

**Describe your experience establishing collaborative working relationships with technical and business stakeholders.**

* **Team communication**

So, for internal team communication, we use our tool — **Slack**. And since we use **Slack** every day, we tried that it has all the required chat elements. Among **Slack** features you can find mentions, reactions, embedded videos, GIFs support, pinned messages, favorites and much more.

In addition to instant messaging, our tool also allows users to create and manage tasks. With **Slack** tasks, you can not only easily organize your daily activities but also communicate in task discussions like in threads.

* **File sharing**

We think that **Google Drive** is a great solution to store files in one place and easily share them.

* **Project management**

Our choice is **Jira**. It provides a lot of useful features like boards with to do/in progress/done categories, reports with real-time insights, roadmaps and others to assign work and manage team activity. Given all this, Jira became the best solution for us to organize the workflow.

* **Audio / video calls**

We use **Microsoft Team** as a conferencing collaboration tool.

* We have a Daily open team/ project standup including relevant stakeholders to consider immediate issues and workaround.
* We have a team building workshop with stakeholders.
* Workshop on role/responsibility expectations and accountability from stakeholders.
* Promoting open culture and continuous feedback.
* Monthly team gathering /events /games.
* Brainstorming sessions for idea generation.
* Leadership meeting/workshop to create motivation, common understanding of vision/goal.

***How do you address competing deadlines?***

***Describe the following items on a project that you have worked on?***

***a. Who was the customer? Tell me about yourself***

***b. What was the business problem?***

***c. Your role in the project - Tell me about yourself***

***d. The tech stack used and considerations driving its selection***

***Java, Microservices, Web Services, AngularJS, HTML, CSS***

***e. The development methodology - Agile Methodology and Scrum***

***f. The greatest obstacle encountered and how it was resolved***

***Blameless***

***g. The length of the project and result***

***The length of the project depends on the requirements of the client and also on the budget. If the requirements are changing then the project will be extended. We usually had a project which lasted for 5-6 months and even more than that as i said depends on requirements and budget.***

***Describe your experience working with the Agile Application Development Team.***

***Provide some project examples in your explanation regarding roles, responsibilities,***

***and the processes utilized.***

***This role has various functions and responsibilities. Please describe your knowledge, skills and work experiences that you feel makes you the best candidate for this position. Please provide one or two examples from your experience that demonstrate your ability to carry out the duties of this position.***

***Please describe how your background, education, and experience make you the best***

***candidate for the position***

***Scoring pointers: Experience in application development,***

***software development life cycle, maintenance and operational support***

***Participation of technical projects***

***Hands on technical expertise in any web technologies, cloud***

***or legacy applications***

***understanding of project management methodologies like***

***Agile/waterfall/ scrum***

***Participation in creating documentation (project /operational)***

***Experience in Testing methodologies, scripting, automation***

***What is ITIL? What are the phases of the ITIL Lifecycle?***

***Please describe your experience in implementing ITIL processes using ServiceNow or similar tools.***

***Explain Your experience in designing and implementing a Service Now based applications.***

-> As a system analyst I was involved in all the phases of sdlc starting from planning, analysis, design, implementation and maintenance.

-> I was actively involved in gathering requirements from the customer, analyzing the requirement, preparing business req doc/ functional req document/system requirement document/ user stories/ prototypes/rtm and reiterating the requirements with the stakeholders to make sure we understood the requirements correctly.

-> I was involved in deciding the tech stack of what tools that are needed for the project based on the requirements and the budget that is allocated to the project.

-> I have hands-on experience working in html, CSS and JavaScript. Since the application is a single page application we have chosen angular JS instead of using plain html and JavaScript. And angular is the quickest way to build single page applications with the help of HTML.

-> I have experience in deploying these applications in the AWS cloud. We have a EC2 service in AWS which is just an instance where we can login and deploy the application like how we are doing it locally.

-> We have used different methodologies for the different projects like agile and waterfall. Earlier we have used waterfall but now are using agile for the projects since it is more productive by having sprints for every two weeks and having the retrospective sessions after every sprint which made our work much more efficient and productive.

I have performed testing in different env like QA, UAT. Prepared RTM and also worked on automating test cases for Web applications using Selenium webdrivers with python.

**I was working for Mercedes Benz**

Tech stack that we have used is Java ,JavaScript, angular JS, HTML, CSS and a few other JavaScript frameworks.

Since the application is a single page application we thought of choosing angular I was working on a business problem where we may need to validate the customer address that he has put in. And based on the address we have to redirect the user to a different view. It started erroring out when a user puts a wrong address and then we tried to validate the address based on the google api and we tried to do client side validation before it is sent to the server.

My role in the project is to work as a system analyst and to gather requirements from the customer and try to accomplish it in the given deadlines. Recommending tools that are correctly suitable for the application. Having a project plan and dividing the tasks to technical requirements and adding those requirements as tickets in (JIRA)

JS instead of using plain html and JavaScript. And angular is the quickest way to build single page applications with the help of HTML.

We have used Agile for our project. We have chosen agile over waterfall because there were many new requirements that used to get added to the ongoing development. And it is easy to incorporate into the project by having it in agile. It can be possible by just adding it to the sprint.

Greatest obstacle is that many of our customers/users started using the application by accessing it through their mobiles and tablets. In the era of Smartphones, websites should be responsive enough on the smaller screens. If your web applications frustrate or confuse users, then it is difficult to maintain your customers' loyalty for your website. Then we started migrating the UI to use dynamic JavaScript frameworks like bootstrap that are responsive to any screen whether it is mobile or laptop or tablet.

Typically our length of the projects last from 5-6 months based on the requirements and the budget limitations. We had successful releases in our projects when I used to work for different clients.

CREATE PROCEDURE SelectAllCustomers @City nvarchar(30)

AS

SELECT \* FROM Customers WHERE City = @City

GO;

**EXEC SelectAllCustomers @City = 'London';**

**Select statement in from clause.**

**Used to write complex SQL queries without join and subqueries operations**

**create a temporary table that could be referenced by the SELECT statement**

**SELECT**

**column\_names ...**

**FROM**

**(**

**SELECT**

**\***

**FROM**

**table\_name**

**);**

1. [↑](#footnote-ref-0)