

A PRAGMATIC STEP TO DEPLOY LOW-CODE WEB APPS ON APEX CLOUD SERVICES FOR EMERGING BUSINESS ASSISTANCE

By

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ABSTRACT

Traditional approaches to web application development using the full-stack development model are inefficient. In today's rapidly changing business environment, organizations must rely on technology solutions that can be built and deployed in days or weeks, not months or years. Low-Code Development Platforms (LCDPs) compete with various features and technologies to provide business applications without prior knowledge of Internet technologies. Oracle Application Express (APEX) assists in the development of fantastic applications with little or no code in the Oracle database, as well as in the deployment of modern data-driven applications on the Oracle cloud platform, allowing users to quickly build secure business web applications with the best options., which can be accessed using an internet browser on desktop computers or mobile phones through its responsive web design without cost and time. Therefore, this paper demonstrates a pragmatic step toward deploying applications in a standalone database cloud using APEX services, which is focused on creating tables or converting spreadsheets into scalable, secure, and responsive web applications in minutes and providing automatic chart analysis reports for the business. As a result, individuals, Small-Scale Industries (SSIs), and Small and Medium Enterprises (SMEs) are encouraged to use cloud services that are always free with a 20 GB storage limit, which is outstanding resilience for cloudless web applications designed for new trends and business support free of charge. Machine learning in APEX Services can also be used to make web apps better for business intelligence in the future.

Keywords: Oracle Application Express, Web Apps; Business Developments; Low-code development platforms, Oracle Cloud Infrastructure (OCI).

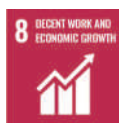
INTRODUCTION

The terms "low-code" and "no-code" were initially used in the development sector in the 1980s and 1990s. To simplify the development process, a variety of solutions and platforms were provided to programmers, most of which used initial Rapid Application Development (RAD) and Computer-Aided Software Development (CASE) tools. Low-code is a software development methodology that employs a small amount of coding to create

applications and processes. Instead of extensive coding, a Low-Code Development Platform (LCDP) (Sahay et al., 2020) incorporates visual interfaces with simple logic and drag-and-drop elements into the application. These insightful tools permit users with no proper expertise in coding or software development to create mobile and business web applications. The low-code platform has grown in popularity as a quick and easy alternative to traditional software development. Low-Code Development Platforms (LCDPs) are like No-Code Development Platforms (NCDPs) intended to speed up the application development process. According to a low-code platform can be used by both expert and non-expert developers to construct apps of varying degrees of



This paper has objectives related to SDGS



difficulty to suit business demands for development, automation, and fast-track digital conversion. Traditional coding methodologies take longer to develop applications, and no-code solves the need for workflow automation and custom software creation faster. Without learning code, any employee can become a citizen developer using no-code. It enables organizations to streamline processes, respond rapidly for changes, better serve customers and workers, and expand.

Oracle Application Express (Oracle APEX or APEX) is a cloud-based application, which is exemplified by Ahmed, 2016. Create and deploy attractive apps that address real-world problems and give immediate benefits using Oracle APEX. It provides all the tools that are needed to create apps on a single, extensible platform that works with the Oracle Database.

1. Comparison Between Low-Code and No-Code

Creatio (n.d.) explained more about low-code and no-code platforms with the use of graphical user interfaces or visual interfaces to enable and produce business applications. Low-code platforms can still include coding in some cases, whereas no-code platforms do not require any coding at all. No-code technology is aimed solely at non-expert developers, whereas low-code technology is aimed at both non-expert and expert developers. Low-code platforms, like no-code platforms, may still necessitate the development of larger and more complex applications. Platforms can combine low-code and no-code technologies and are used by forward-thinking businesses to improve flexibility and control over the development cycle. Three factors primarily distinguish no-code development platforms from low-code development platforms such as,

- *Coding Skills:* No-code platforms are available to every end-user as no technical skills are required for the user. Developers that are experienced with coding and who can operate within a platform to facilitate and streamline the development process are required for low-code development.
- *Core Design:* On no-code platforms, an end-user chooses an app's design using drag-and-drop logic. Low-

code support uses a similar development paradigm but relies more on coding to handle the core architecture of an app.

- *User Interface:* To make application design easier, no-code relies on a pre-defined User Interface (UI) layer. Low-code platforms provide more UI flexibility at the cost of increased coding needs.

Low-code development includes the ability to do coding for the sake of application customization or complexity, whereas no-code development contains no coding at all to certify that applications are as user-friendly as possible. Similarly, low-code platforms contain the option of opening, looking at, and altering the source code of the applications, while no-code platforms do not. Minimizing code development time is considered an advantage by most of the LCDP. Additionally, the minimum amount of source code reduces the source code development time and makes the application development and deployment much easier.

1.1 Advantages and Disadvantages

Creatio (n.d.) also compared low-code or no-code development in a company's strategy with its numerous advantages as well as disadvantages. Several benefits are more obvious than others, but when low-code or no-code is used in a company's business processes, it can be executed as follows,

Increased Dexterity: Rapid development through visual interfaces allows businesses to respond quickly to change markets and client demands.

Faster Transformation: Quickly automating processes with new technology, firms that use low-code or no-code development primarily become package firms. Because so many new solutions have been made in such a short amount of time, digital transformation is happening faster.

Price Decreases: When subject developers have the low-code or no-code tools to create useful applications on their own, there is less of a need to hire additional Information Technology (IT) specialists, which is both expensive and time-consuming.

Increased Potency and Output: Platforms with low and no

code improve potency and output in nearly every department. Employees will prioritize additional artistic tasks with the assurance that routine obligations will be met correctly as additional tasks become automated. IT workers will get benefited from a much shorter backlog of tasks as citizen developers bridge the delivery gap, allowing them to focus on more advanced, large-scale development as well as the maintenance of the company's IT infrastructure.

Adaptability: Customers' and competitors' demands will change immediately. Low-code or no-code development not only allows businesses to create apps faster but also allows them to change existing apps much more easily. Immediate changes are frequently made in response to a business's desires.

More Sophisticated Apps: Low-code or no-code apps are more likely to succeed than apps with a higher likelihood of recurring changes. IT consultants will use low-code and no-code to create these apps faster and receive instant feedback, as well as automate testing to speed up the process. Subject matter experts will create applications that are aware of what they have and how to use them.

2. Low-Code Development Platforms

Rapid Application Development (RAD) is a software development methodology that prioritizes speed and feedback over planning and even design specifications. Prototypes are quickly delivered to users to ensure directly involved in feedback and development. Low-code and no-code platforms evolved from earlier RAD tools that provided development-like capabilities to business users (i.e., non-IT professionals). Platforms for low-code, no-code, and RAD are visual software development environments that enable expert and non-expert developers to drag and drop application components, connect them, and create mobile or web apps.

There are low-code, no-code, and RAD platform vendors available (Arora et al., 2020; Gavrilova, 2021; Richardson & Rymer, 2016; Sanyal, 2021; Software Testing Help, 2022; Vincent et al., 2019). They are Adobe ColdFusion, AgilePoint, Alpha Anywhere, Appian, Betty Blocks, Bizagi, Broadcom CA Plex, Caspio, community, Creatio,

DronaHQ, Digital Supply Chain Platform (DSI), Fujitsu RunMyProcess, HCL Domino, IBM Cloud Pak for Applications, Kintone Rapid Application Development, KissFlow, Knack, Visual LANSA, MatsSoft MATS, Mendix, Microsoft PowerApps, Microsoft Azure App Service, Neutrinos, Oracle Application Express (APEX), Oracle Visual Builder Cloud Service, OutSystems, Pega BPM, Pillir, Profitbase InVision, QuickBase, Rocket LegaSuite, Salesforce Platform, ServiceNow, ServiceNow Now Platform, Skuid, Software AG Natural, Temenos Quantum, Thinkwise, TIBCO Cloud Live Apps, TrackVia, WaveMaker, WorkflowGen, Zoho Creator, Zudy VINYL. Among them, the top vendors are ServiceNow, Microsoft PowerApps, Pega BPM, Salesforce Platform, Appian, Bizagi, Oracle Application Express (APEX), Zudy VINYL, Mendix, and ServiceNow Platform.

3. Why is Oracle APEX?

An autonomous database (Oracle Autonomous Database, n.d.) is capable of driving, securing, and repairing itself. It uses machine learning to automate tasks such as database optimization, security, backups, updates, and other administrative tasks that were traditionally handled by Database Administrator (DBAs). Unlike a traditional database, an autonomous database can accomplish all these tasks and more without the need for human intervention. Several key intelligent technologies enable the automation of laborious but critical tasks in autonomous databases, such as routine maintenance, scaling, security, and database tuning. A database management system can hold both structured and unstructured information. Data warehouses, transaction processing, JSON databases, and APEX services can all be supported by an autonomous database. Provisioning, security, updates, availability, performance, change management, and error prevention are all automated in autonomous databases provided by artificial intelligence and machine learning.

Oracle has two types of Low-Code Application Platform (LCAP) solutions, such as APEX and the Oracle Visual Builder. Oracle APEX enables REST (Building an App Using REST, n.d.) interfaces and is a cloud-based Software as a Service (SaaS) to build scalable, secure, and responsive

web applications that can run well on both desktop and mobile devices. Whereas the Visual Builder Cloud Service (VBCS) uses a Service-Oriented Architecture (SOA), is a cloud-based Platform as a Service (PaaS), and is a hosted environment for the application development infrastructure, APEX is one of the top 8 rapid application development software tools and has an 8.2 rating in the PeerSpot review conducted in February 2022. On the other hand, the Oracle Visual Builder Cloud Service is costlier than APEX.

APEX allows developers to create and publish visually beautiful apps that address real-world problems and deliver immediate value. Oracle APEX provides low code (Low Code Development with Oracle Autonomous Database (n.d.); Overeem & Jansen 2021) with data management and visualization through responsive web design. Oracle APEX's goal is to make it easy for developers to create engaging apps with superior functionality, performance, and end-user experience. To achieve this goal, Oracle APEX promises to reduce the enormous challenges of designing and delivering corporate apps. Oracle APEX is an excellent solution for future development projects since it eliminates complexity, allows for simple development, is powerful and well-tested, and is safe and portable.

4. Statement of the Problem

Nowadays, any business development requires a website to disseminate the business, attract customers, and provide support to the customers in various ways. To improve the business, customer service needs to be enhanced. Customer service can be defined as interactions or relationships with a customer who needs assistance with a product or service purchase. Customer experience and feedback are important in any business. The trend toward establishing business relationships with customers to provide services is supported by internet websites and mobile apps.

The problem with business extensions is that registering a web domain, designing and developing a website, and deploying a website are all extra costs for business owners, as is hiring a data analyst to analyze daily

transactions. This problem is very challenging for individuals, business incubators, Small-Scale Industries (SSIs), and Small and Medium Enterprises (SMEs) to extend their business through websites and mobile apps, which includes additional costs for them. On the one hand, the business owners who spent money on establishing websites, mobile apps, etc., will lose their profit, making it unnecessary for them. On the other hand, they may not improve their business.

4.1 Assumptions and Hypotheses

Newly graduated students are mostly looking for a job, but it is also encouraged to open a business. If the graduated students get a job, they live as employees of the company, whereas once they start up a business, they are the owners of that business. Individual business owners, SSIs, and SMEs can improve their businesses by deploying low-code web applications through APEX services to promote their businesses, which can also be accessed on mobile phones thanks to the responsive design adopted by APEX. It enables businesses to speed up their business operations, adapts quickly to changes, better meet the needs of customers, and contribute to the economic growth of any country. The proposed research assumes that there is no cost for individuals, business incubators, SSIs, and SMEs to develop and deploy web apps. The hypothesis of the proposed research work can provide prominent sustainability for keeping track of initial business transactions, which will include analytical reports without additional efforts.

4.2 Significance of the Research

Low-code and no-code development platforms can help businesses in any industry improve their Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and Business Process Management (BPM) by providing the visual tools needed to build new apps and automate their ideas. They encourage digital transformation, empower citizen developers, and foster an environment in which any department can develop solutions to improve its operations. Regardless of a user's coding skills, low-code or no-code platforms can make everything from process design to development faster,

easier, and more accessible.

Many business individuals, incubators, SSIs, and SMEs require a web application to manage their daily transactions, whether to maximize profit or improve customer service over the internet. Business owners can have a thorough understanding of how to easily create modern web apps that are functional, robust, and flexible using Oracle APEX. Based on the specific needs, it builds web apps as solutions for almost any type of SSI or SME Company in any part of the world. It always broadens the knowledge needed to build any type of web application, from those just getting started to those struggling to survive or on the verge of folding. At the same time, the role of graduates in becoming entrepreneurs through business incubators, SSIs, and SMEs will provide employment opportunities and improve the economic status of any country.

4.3 Scope and Limitation

Visual interfaces allow APEX low-code web apps to be delivered quickly. APEX enables company processes to adjust swiftly to changing markets and customer demands, and it can be accessed via a web browser on a desktop or laptop computer, as well as on a mobile device. Customer demands can be met using business analytics through the graph or chart support provided in the APEX apps.

With new technology, business firms can achieve faster transformation and automate processes. The abundance of new solutions developed in such a short period of time promotes faster digital transformation. Multiuser access is allowed in the APEX, which can target additional artistic tasks for different employees within the business. Business owners can create web applications themselves. There is less or no need to hire extra IT specialists, which is both costly and time-consuming and can be avoided. The customers' demands can be identified immediately through charts or graphs, giving greater effort to the business analysis and improvements in supply demands.

For instance, APEX services are always free, but with limitations. It has just 1 Oracle Compute Unit (OCPU) and 20 GB of storage. The database version presently given is 19c. If the business is growing, the user can also upgrade

the APEX services and also prefer to develop more sophisticated apps with the help of IT consultants. Subject developers will create applications knowing exactly what they have and how to use them.

5. Literature Review

Behavior-Driven Development (BDD) is a method for development teams to define executable and testable requirements. In BDD, non-technical stakeholders design application behavior using scenarios that are understandable to everyone in the team. Non-technical stakeholders typically create scenarios using a limited natural language like Gherkin. By comparing 13 BDD tools, detailing a prototype implementation of the technique, and conducting a large-scale developer poll, Patkar et al. (2021) evaluated an approach and emphasized the perceived improvements over the present approach. This is a distinct approach to BDD in which non-technical stakeholders are involved equally in the BDD process, and behavior specification and verification are handled.

Low-Code Software Development (LCSD) is a game-changing paradigm that combines visual programming, a graphical interface, and model-driven design to make software development easier and require less hand-coding. LCSD is an innovative method of rapid app development that combines minimal source code with interactive graphical user interfaces. The LCSD (Al Alamin et al., 2021) has 13 subject topics divided into four categories, such as customization, platform adoption, database management, and third-party integration. It improved the understanding of LCSD platform providers among LCSD practitioners and developers, as well as LCSD researchers and educators.

Martins et al. (2020) study of low-code platforms compared OutSystems, KissFlow, and Mendix in terms of the features, functionality, integrations, average learning time, and development ease. It built the complete program using OutSystems, a low-code platform with three main user agents, which are employees, human resources, and superusers, each with its own set of permissions and the ability to accomplish specific activities. The system's heart is the OutSystems platform

server. The compiler takes the application model produced in the visual editor and creates all native application components ready for deployment to an application server. The developed application components are deployed to an application server using deployment services.

The value of low-code development and the factors investigated by (Alsaadi et al., 2021) with the influence of LCDP adoption, as well as conducting an online survey in Saudi Arabia to better understand why developers use LCDP. There were 23 questions in total, divided into three categories. Ten open-ended questions, ten closed-ended questions, and three Likert scale questions were included in the survey. Customizing built-in functions on low-code systems has been identified as a hurdle due to a lack of programming language expertise. Furthermore, several of them struggled with LCDP due to a lack of understanding of how to use and handle these platforms.

The Low-Code/No-Code (LCNC) development platform is a graphically integrated development environment that enables non-technical developers to construct mobile and web apps by dragging and dropping application components. Hyun (2019) created a Low-Code/No-Code solution that combines the benefits of hybrid and native apps in one package. It supports both iPhone and Android phones at the same time, as well as a range of templates, and it avoids developer-oriented development methodologies by using the AppOS non-coding software production process.

The low-code platform market is divided into five categories (Richardson & Rymer, 2016) of platforms, such as general-purpose, request-handling, database apps, process apps, and mobile apps. Web and mobile application design, deployment, and distribution are all managed by general-purpose platforms. Request-handling programs with little to no code accept, process, and track requests. Database platforms acquire, query, and show data from relational databases. The flow logic, applications, and database systems are graphically processed using visual process and case modeling tools. All low-code suppliers have some assistance in developing and deploying mobile apps.

UX/UI designers and developers (Pacheco et al., 2021) used a low-code platform to improve the efficiency of UX/UI designers and developers. Model transformations were used to create a method for automating a portion of the process. It automates the creation of application pages and screens by developing mockups in a design tool such as Figma or Sketch and then applying the design to a front-end tool such as OutSystems. A professional team of front-end engineers from a well-known enterprise-grade low-code development business tested them on real-world applications.

Bock (2021) emphasized static, dynamic, functional, interaction, and other factors such as roles and user rights systems, as well as creating block-like applications such as Business Intelligence (BI), Artificial Intelligence (AI), and Robotic Process Automation (RPA). The platforms identified in the pre-study included simple data management platforms, traditional Workflow Management Systems (WFMS), expanded, Graphical User Interface (GUI) and data-centric IDEs, and complex multi-use platforms for business application configuration, integration, and development.

A no-low-code application development method was compared (Pique Solutions, 2019) with a traditional JavaScript framework technique to explore the two real-world application modules, which are interactive grid and faceted search. It compared the development of time and motion analysis on Oracle Cloud Infrastructure using Oracle Application Express (APEX) to a traditional method based on the JavaScript framework (ReactJS). APEX is more than 38 times faster than a JavaScript framework method based on the average of an interactive grid and a faceted search.

6. Research Methods

The research method exemplified the empirical model, which will be focused on designing the pragmatic steps in deploying a low-code web application through, Oracle Cloud Infrastructure (OCI). For all, the business owner expects to first create a cloud account by entering their personal details, including credit card information, at the beginning of the process.

6.1 Create an Oracle Cloud Account

Oracle offers cloud services that are always free and can be utilized indefinitely without interruption. It has complete freedom to utilize always-free resources for as long as it likes, subject only to the capacity limits stated. Autonomous databases, virtual machines, and object storage are all provided as part of the always-free access. It can use the Oracle cloud to build, test, and deploy applications for free. To create a cloud account, visit <https://signup.cloud.oracle.com>. After creating an Oracle cloud account, sign into the cloud using <https://www.oracle.com/cloud/sign-in.html>, which will be requested to enter the cloud account name. Then it will direct to two options, which are Single Sign-On (SSO) or Oracle Cloud Infrastructure direct sign-in. If using Single Sign-On (SSO) for the tenancy of an identity provider, the user will have to enter a username with an email ID and password. However, the password for SSO or direct sign-in is different, which is shown in Figures (1) and (2).

Figure 1. Single Sign-On (SSO)

Figure 2. OCI Direct Sign-In

6.2 Deploy a Low-Code App on Autonomous Database using APEX

Oracle APEX is a well-known low-code development platform for building data-driven and opportunistic corporate applications quickly. When APEX and Oracle Database are combined, a fully integrated environment for designing, deploying, managing, and monitoring data-driven business applications that look great on mobile and desktop platforms is created. In the get started tab, the link for quick start application development with deploying a low-code app on an autonomous database using APEX can be found. This deployment of a low-code app on an autonomous database using APEX can be done by the following steps (Jennings, 2022), shown in Figure 3.

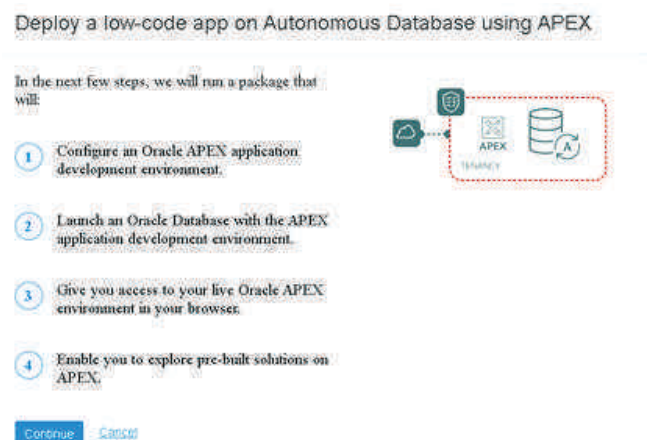


Figure 3. Steps to Deploy APEX

Step 1. Configure an Oracle APEX Application Development Environment

The deployment process will collect the administrator password for APEX administration before proceeding with the creation of resource stacks and the launch of all resources to complete the deployment, which is shown in Figures 4 and 5.

To enable support for Oracle database client connectivity, it will create an autonomous transaction processing database with APEX incorporated, rather than

Deploy a low-code app on Autonomous Database using APEX

The screenshot shows the 'Deploy a low-code app on Autonomous Database using APEX' wizard. The 'Compartment' is set to 'drbata (root)'. An information box explains that a compartment is a collection of related resources. The main section is 'Database ADMIN Password (Required for APEX Administration)', which includes a password field and a 'Re-enter the password' field. A note specifies that the password must be 12 to 30 characters and contain at least one uppercase letter, one lowercase letter, and one number. Below this, there is a checkbox to 'Enable support for Oracle Database Client connectivity (SQL*NET)', which is checked. At the bottom, there are 'Start deployment', 'Back', and 'Cancel' buttons.

Figure 4. Password Requirement

Deploy a low-code app on Autonomous Database using APEX

The screenshot shows the 'Deploy a low-code app on Autonomous Database using APEX' wizard progress. A green checkmark indicates that the solution has been deployed successfully. The progress bar shows four steps: 'Create Resource Manager stack' (Completed successfully), 'Launch all resources' (Completed successfully), 'Complete deployment' (Completed successfully), and 'Manage deployments'. A 'Launch APEX' button is visible at the top right. A 'Close' button is at the bottom left.

Figure 5. Deployment Process

supplying specialized APEX services. The APEX workload type is created in an autonomous database version 19c with shared infrastructure for always free configuration options. It can utilize up to 1 core and can utilize up to 0.02 TB (20 GB) of storage.

Step 2. Launch an Oracle Database with the APEX Application Development Environment

On the Oracle cloud dashboard, to find the created APEX workload, click and open the APEX workload to view buttons for the database actions, DB connection, performance hub, service console, and more actions. Additional actions include manage to scale, stopping, restarting, restoring, creating clones, managing administrator passwords, managing encryption keys, renaming databases, upgrading instances to paid, and moving resources. Below the main button, there is a tab that shows autonomous database information, tools, and tags. To begin the APEX services, go to Tools, then click on Open APEX, as shown in Figure 6.

The APEX application express opens the administration service, which requires the password that can be created during the APEX deployment, as shown in Figure 7. Before start building the program, it must set up a workspace. A workspace is a shared workplace where numerous developers can work on the same project at the same time. To create new workspaces, enter the database username and password, then click on the "create workspace" button, which is shown in Figures (8) and (9). This will create a new workspace based on the database

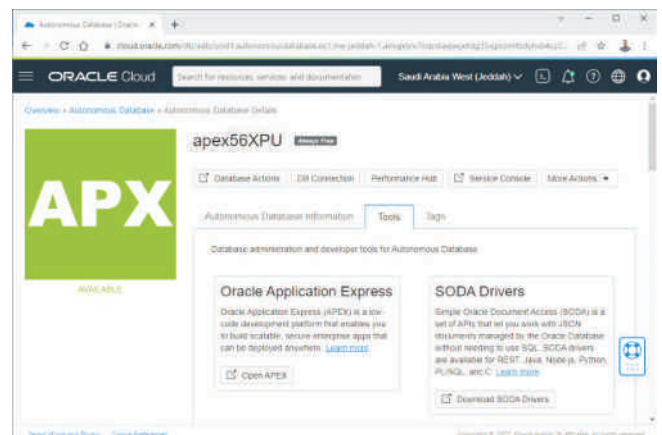


Figure 6. Open APEX

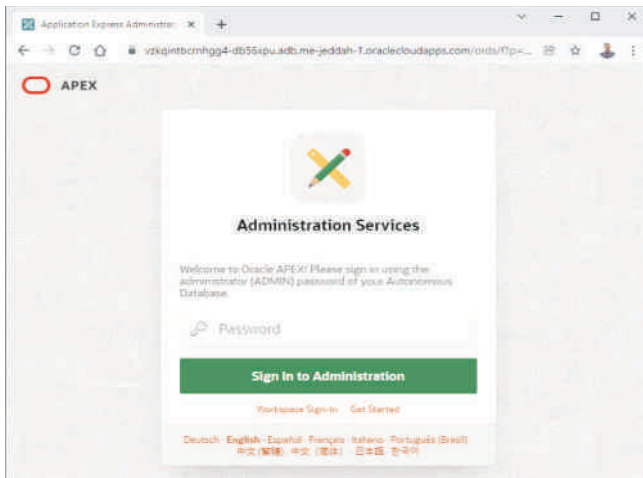


Figure 7. APEX Admin Service Sign-In

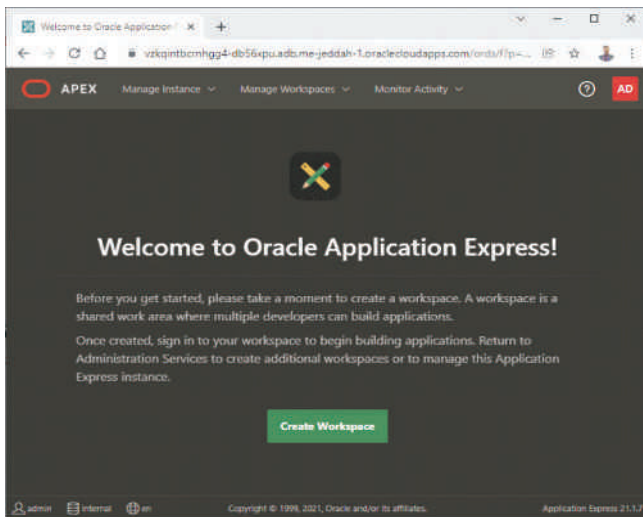


Figure 8. APEX Workspace

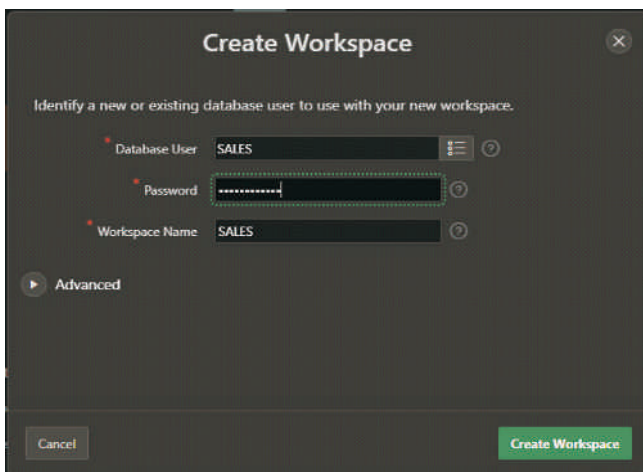


Figure 9. Create Workspace

user-specified, and the workspace name will be the username that is assigned automatically.

Once the workspace is created, the users can now build the application by going back to the Oracle cloud dashboard and selecting Open APEX in the APEX workload under the tools. To sign into the APEX launch pad shown in Figure 11, the Oracle application express requires the workspace name, username, and password, which will be used in the APEX builder sign-in shown in Figure 10.

The app builder shown in Figure 12 allows to create a new application or import an already created application. The app design provides app components such as reports, forms, calendars, charts, maps, shared components, computations, validations, and processes, which can also be incorporated into different pages. This paper demonstrates a step-by-step approach to creating an application.

As shown in Figure 13, there are three ways to create an application. The first is to create an application with new

Oracle Application Express

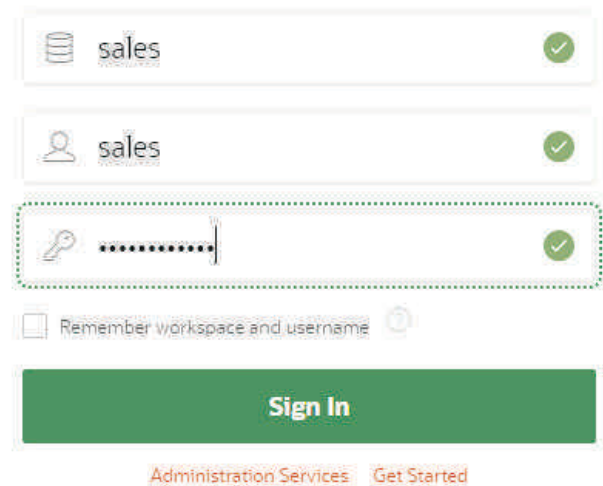


Figure 10. Workspace Sign-In

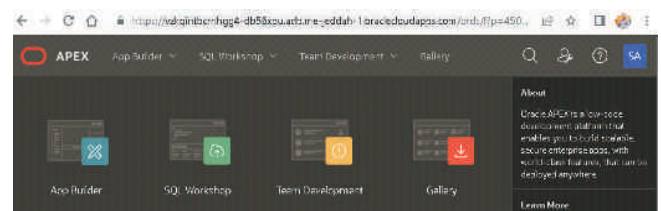


Figure 11. APEX App Builder

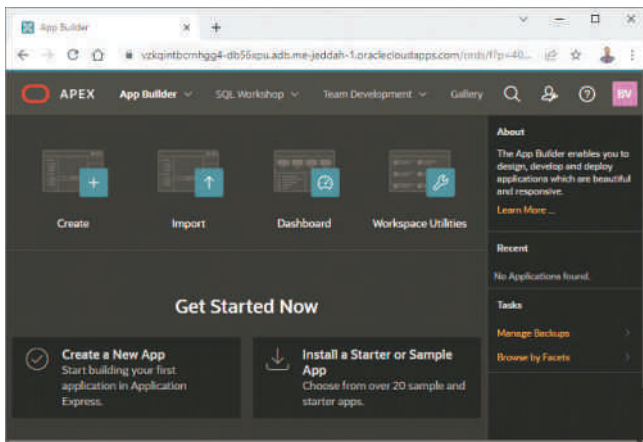


Figure 12. Create New App

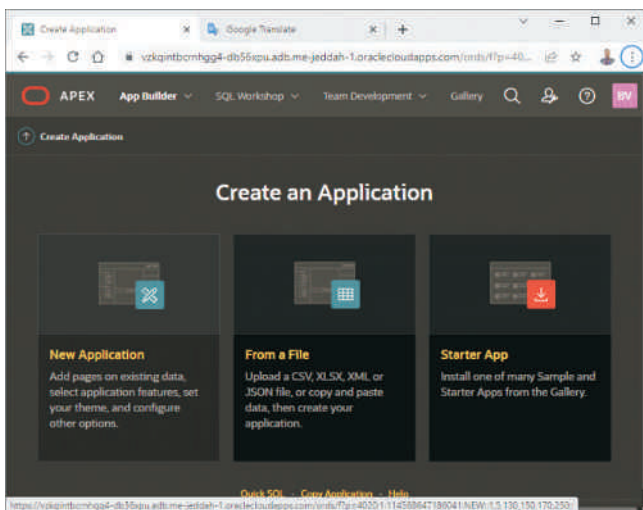


Figure 13. Ways of Creating New App

pages for which the database table should be created in advance. The second is to use an existing excel file, such as a csv, xlsx, xml, or json file. The third is to use the starter app, which means using the available application template, as described in step 4 of this paper.

In the first method, first create a table (APEX, n.d.) using the object browser, which is accessible through the SQL workshop. Create a page in an application that connects to an existing table. To create the table, the object browser collects the table name, column name, data types, null or default value, and primary key constraints. For instance, the product_details table was created with the object browser shown in Figure 14, and it may be required to continue configuring a primary key, foreign

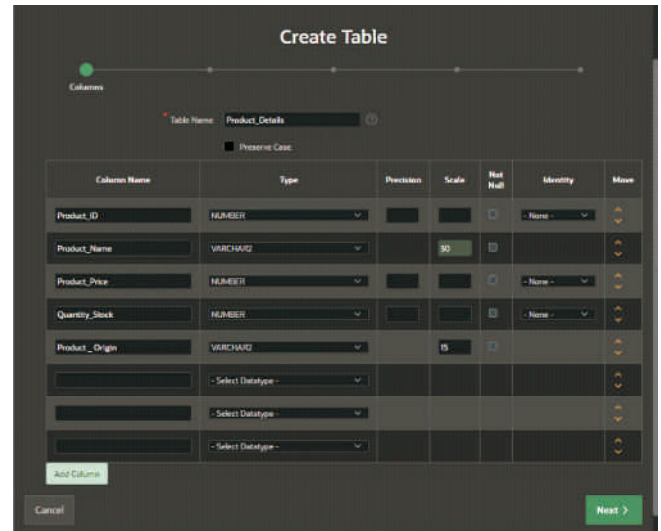


Figure 14. Object Browser

key, constraints, check constraints, and unique constraints for the table. Respectively, customer and order tables were also created. These tables are linked in the form that is used to create the application shown in Figure 15. It can add a new page, which has many forms of applications; they are bank, calendar, cards, chart, dashboard, faceted search, form, interactive grid, interactive report, map, master-detail, and wizard. In such a way, any business-related tables can be created for the needs and can be linked to create the application in an easy way.

In the second method, it must have an excel sheet (Building an App from a Spreadsheet for Oracle Autonomous Cloud Service, n.d.; APEX, n.d.) with all the columns as fields, even including the inserted records,

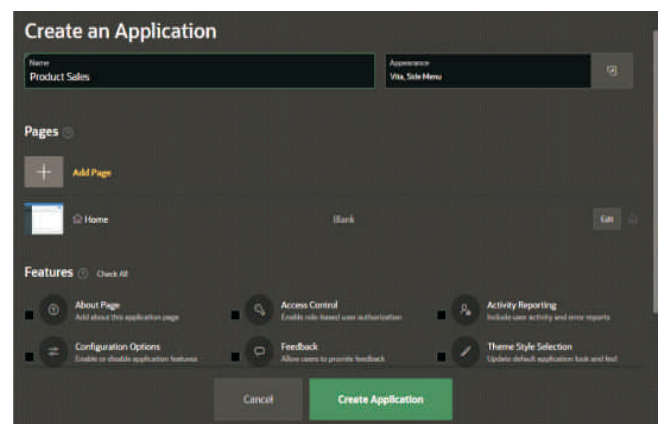


Figure 15. Create an Application

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which can be dragged and dropped as shown in Figure 16 and uploaded into a table structure as shown in Figure 17 and then proceed to create an application as shown in Figure 18. For instance, it used the same column names as in the product.csv file.

Step 3. Give Access to Live Oracle APEX Environment in Browser

The application's development is now complete. To use the application, first create a user, which can be done through the administration settings on the manage users

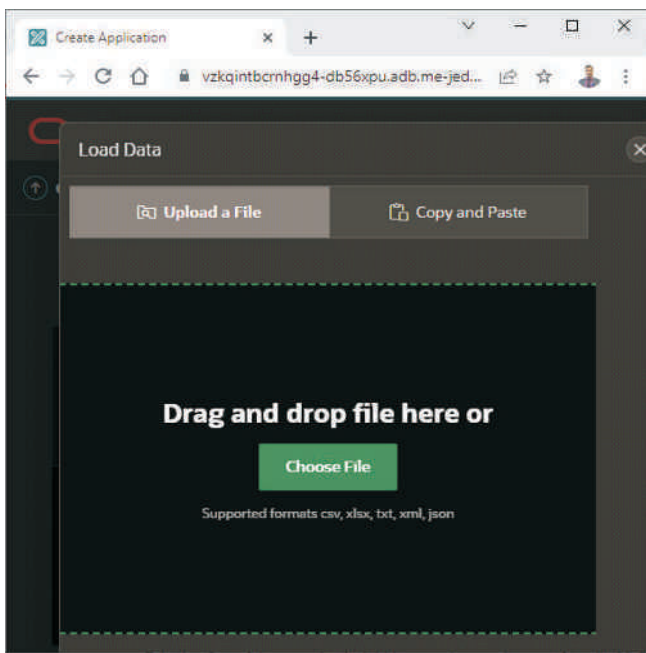


Figure 16. Upload the File to Creating Table

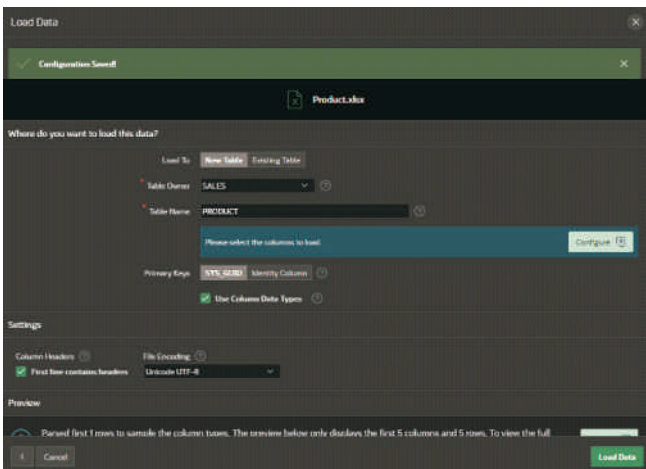


Figure 17. Load the Data

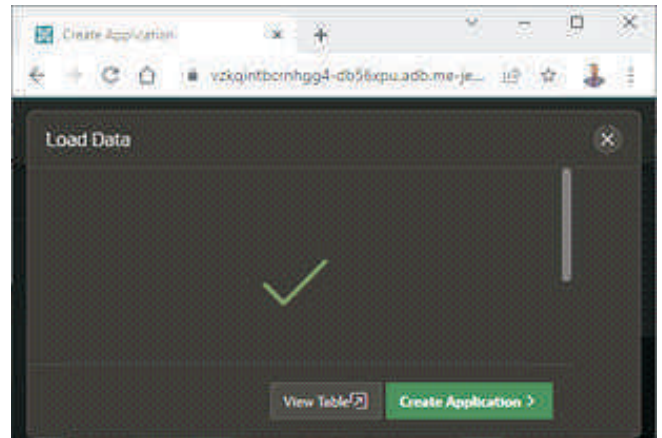


Figure 18. Creating an Application

and groups option, as shown in Figure 19. The application can be used by more than one person at a time or by groups of people.

Once users are created, it starts running the application as shown in Figure 21, which will require the username and password shown in Figure 20 that were created in the administration settings. The application can now record information, search for specific records, display reports, do business analysis through charts, and so on. The running application forms are shown in Figures (20) to (24).

The APEX service is a low-code application development service on the Oracle cloud platform that is used to create and deploy compelling apps that solve real-world problems and provide immediate value. Oracle APEX gives all the tools that are needed to build apps on a single, extensible platform that runs alongside the Oracle Database. The report can be generated with charts and can be able to do business intelligence to keep track of the business at no cost, which is always free but limited to 20 GB of data.

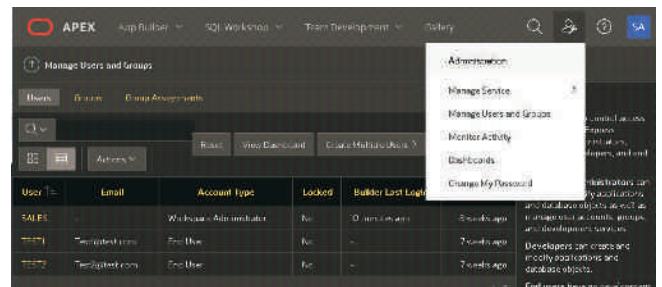


Figure 19. Creating Users and Groups

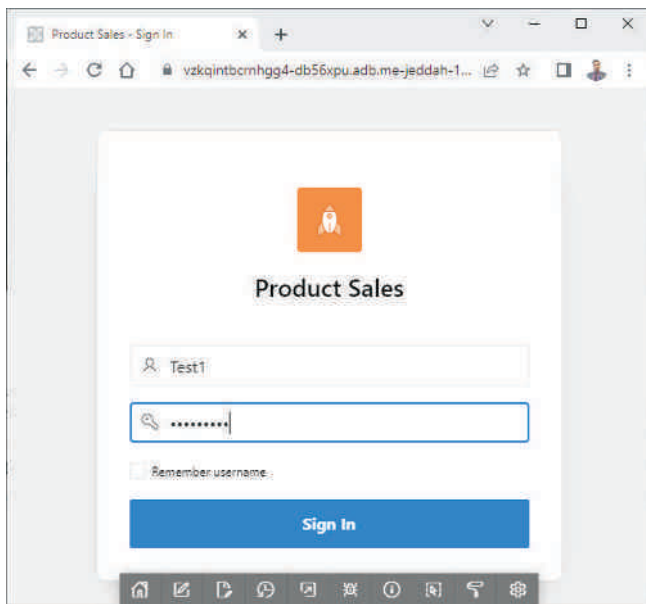


Figure 20. Product Sales App

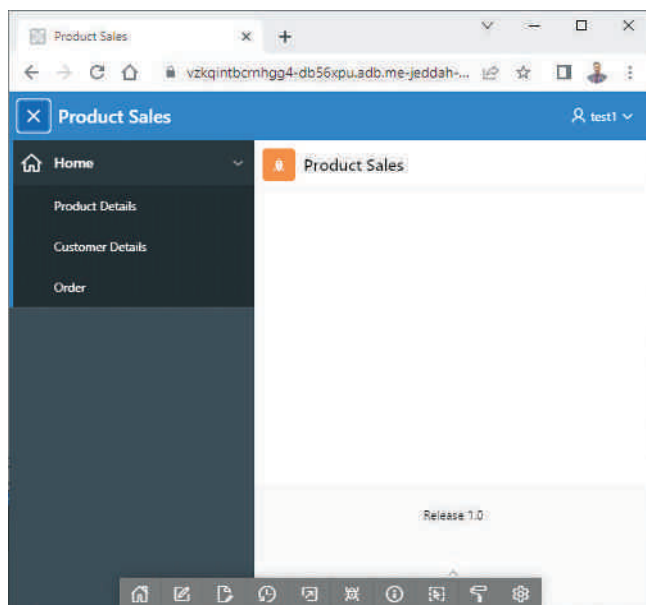


Figure 21. Product Sales App

Step 4. Enable you to Explore Pre-Built Solutions on APEX
Samples can be found here in Figure 25. Pre-built templates are shown in Figure 26 that highlight new features and design patterns, plug-ins that add new capabilities, and pre-built apps that can be used as or customized.

7. Results and Discussion

This paper demonstrated a pragmatic step toward

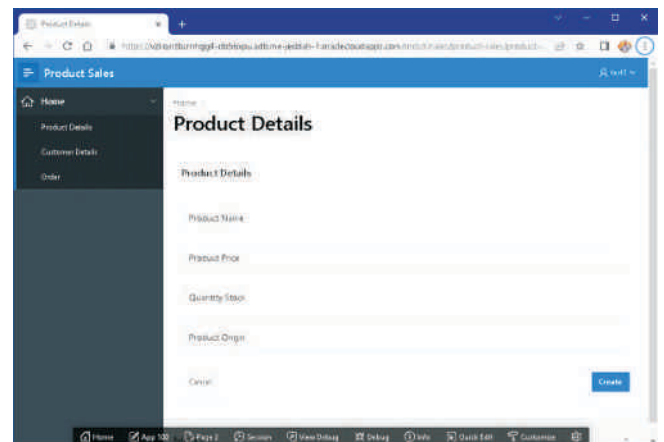


Figure 22. Product Details

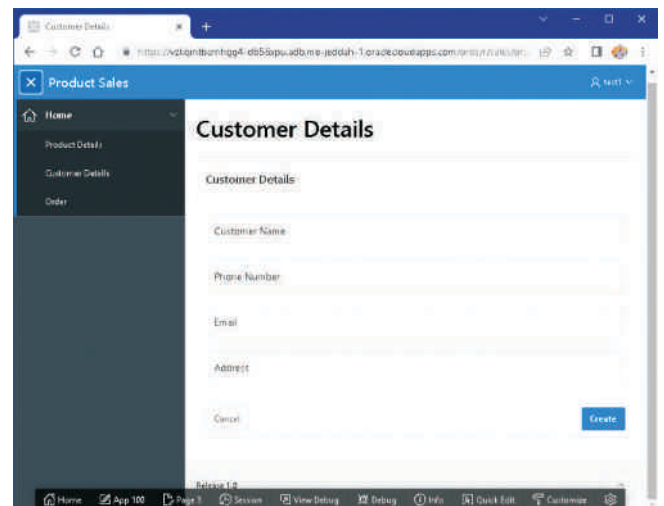


Figure 23. Customer Details

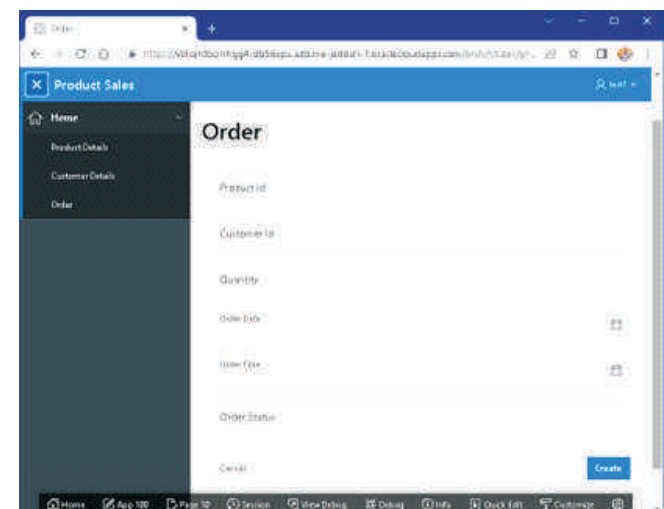


Figure 24. Order Details

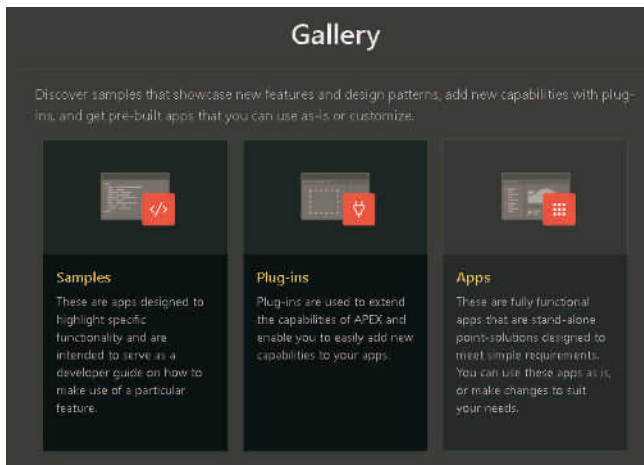


Figure 25. APEX App Gallery

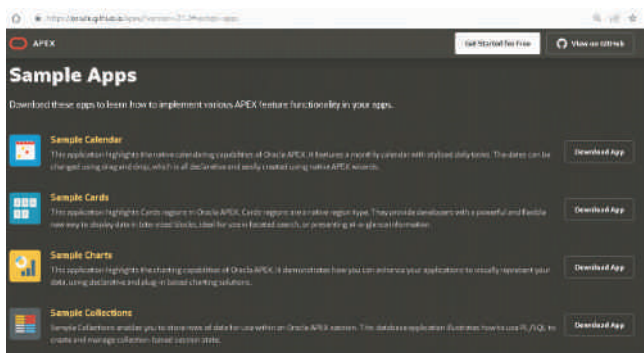


Figure 26. Sample App

deploying the applications on an autonomous database cloud using APEX services, which are focused on three different ways (creating tables, converting spreadsheets, and using a starter app template) of creating scalable, secure, and responsive web applications in minutes and providing an automatic chart analysis report for business understanding. It is highly useful for all individuals, SSIs, and SMEs in any country, since it eliminates the need to invest in registering a web domain, designing, and developing a website, and deploying a website, as well as the cost of data analysis or business intelligence.

Therefore, any business owner can utilize the initial sustainability of cloud-free web apps to support their business progress at no cost. Once the business grows and the data volume exceeds more than 20 GB, the cloud infrastructure CUP and storage space can be scaled up or down further as it is a pay-as-you-go service if

desired. And, if the web app on the cloud instance is not used for a long time, then it automatically stops its services. If the cloud instance is required again, then it should start again.

The machine learning (Sacolick, 2021) logic can be added to the database for the future perspective of business assistance towards growth, and the predictions can be picked up by the APEX application, which supports the mining functions of Oracle data mining through Apache Zeppelin, which is pre-installed in the autonomous database and can serve as a frontend for the database's machine learning algorithms.

Conclusion

A user experience, a data model, data management logic, and business logic are all addressed by all low-code platforms. Electronic forms, business intelligence and analytics, business rules management, predictive analytics, collaboration sites, and other specialized products are among the products that leverage a low-code approach to create business-function-specific solutions. These are better evaluated as vertical solutions than as development and deployment platforms. This paper demonstrated a pragmatic step towards deploying the applications on an autonomous database cloud using Oracle APEX services. Individuals, SSIs, and SMEs may find it more beneficial to use the always-free cloud services with storage limitations of 20 GB. Consequently, this is the prominent sustainability of cloud-free web apps that can be utilized for emerging business assistance at no cost.

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