

ISTANBUL AYDIN UNIVERSITY
FACULTY OF ENGINEERING

ONLINE ORACLE DATABASE EDUCATION WEBSITE

B.Sc. THESIS

Hikmet ARAT
Şebnem GÖKÇE

Department of Software Engineering

Thesis Advisor: Prof. Dr. Hasan Hüseyin BALIK

JUNE 2014

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İSTANBUL AYDIN ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ

ONLINE ORACLE EĞİTİM WEBSİTESİ

LİSANS TEZİ

Hikmet ARAT
Şebnem GÖKÇE

Yazılım Mühendisliği

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HAZİRAN 2014

Hikmet ARAT, a **B.Sc.** student of IAU **Faculty of Engineering** student ID **B1105.090069**, successfully defended the **thesis** entitled “**ONLINE ORACLE DATABASE EDUCATION WEBSITE**” , which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Şebnem GÖKÇE, a **B.Sc.** student of IAU **Faculty of Engineering** student ID **B1105.090042**, successfully defended the **thesis** entitled “**ONLINE ORACLE DATABASE EDUCATION WEBSITE**” , which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor : **Prof. Dr. Hasan Hüseyin BALIK**
İstanbul Aydın University

Date of Submission : 05 June 2014
Date of Defense : 05 June 2014

FOREWORD

This thesis is the result of the need of Oracle Database Education in our country. In our experiences most of the students have considerable amount of knowledge about SQL but very little about Oracle Database. So that's why we decided to go down that road. Our aim was to help especially students and others who like to have information about Oracle Database in their own language.

With the help, support and encouragement of our adviser Prof. Dr. Hasan Hüseyin Balık, we managed to create this website and educational videos within the time we were given. We are very much appreciative and gratified.

Thereby, we sincerely hope that this project would help the ones that would use it since we enjoyed building it.

June 2014

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June 2014

Hikmet Arat
(Student)

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ABBREVIATIONS

ASP	: Active Server Pages
DB	: Database
CMD	: Command
DDL	: Data Definition Language
DML	: Data Manipulation Language
DQL	: Data Query Language
DCL	: Data Control Language
DAC	: Data Administrator Commands
EM	: Enterprise Manager
IIS	: Internet Information Services
IT	: Information Technology
SQL	: Structured Query Language
MSSQL	: Microsoft Structured Query Language
OC	: Oracle Communications
OE	: Oracle Enterprise
TCC	: Transactional Control Command
T-SQL	: Transact-Structured Query Language
UR	: User Roles

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ORACLE DATABASE EDUCATION WEBSITE

SUMMARY

As the preference for Oracle Database increased by companies and corporations since it work in multiple platforms such as Unix, IOS etc. unlike Microsoft Sql Server, the need for Oracle Database education also increased. But the problem is that the internet lacks Turkish Oracle Database help.

The purpose of this project is to create a website with ASP.NET that will have Oracle Database Educational videos that may help people who likes to learn Oracle DB.

At the end of the project, internet users will have another source to study Oracle Database and also team members who work on this project will be have extensive knowledge in Oracle DB, ASP.net and MSSQL.

ORACLE VERİTABANI EĞİTİM SİTESİ

ÖZET

Şirketler ve kuruluşlar tarafından Microsoft Sql Server'ın aksine Unix ve IOS'ta da çalışan Oracle Veritabanı seçimi arttıkça, Oracle Database eğitimi ihtiyacı da artmaktadır. Fakat internet Türkçe Oracle Veritabanı yardımı konusunda eksik kalmaktadır.

Bu projenin amacı, ASP.NET ile içinde Oracle Veritabanı videoları olacak bir web sitesi oluşturmaktır. Böylece Oracle Veritabanı öğrenmek isteyen kişilere yeni bir kaynak sağlanmış olacaktır.

Bu projenin sonunda, Oracle Veritabanı'nda kendine geliştirmek isteyen internet kullanıcıları yeni bir kaynağa sahip olacaktır. Ayrıca bu projede çalışan öğrencilerde Oracle DB, ASP.net and MSSQL konusunda geniş bilgiye sahip olacaklardır.

1. INTRODUCTION

Technologies such as social media, mobile devices, cloud computing, and e-commerce were rapidly advancing, the effects of which have significantly changed customer demands and the nature of business. And despite its size and success until this point, it was time for Oracle to change. In recent years, Oracle has managed short- and long-term success—namely its ability to compete with the biggest companies in various industries over three decades. As a result of this need for Oracle Database sources online increased. Although there are some documents and tutorial in their official website since they embrace an open source strategy, the internet lacks language option for those tutorials[1].

1.1 Purpose of Thesis

The purpose of this thesis is to explain the processes of creating an ASP.NET website that has Oracle Database Lessons Videos in it. The thesis will include the following: description of what ASP.NET is and its connection with Microsoft SQL Server, managing databases efficiently and knowledge of their commands, how to record videos of database lessons and how to integrate them with the website. As result, this thesis will give information about the things mentioned above and the internet will have useful set of information about Oracle Database for people to use.

1.2 Outline

1st Chapter contains information gives broaden information about the purpose of the project.

2nd Chapter is about ASP.NET. It gives information about what ASP.NET is how the web site created using ASP.NET and what programs have been used.

3rd Chapter is about MSSQL. . It gives information about what MSSQL is how ASP.NET integrated with MSSQL and what programs have been used and how databases and their tables created.

4th Chapter is about ORACLE. It explains what is Oracle, Oracle Products and gives detailed information about Oracle Dabase.

5th Chapter is contain information about how the Oracle Database developed.

6th Chapter is contain information about how the websites interface created, how Oracle education videos recorded and uploaded to Youtube and embedded to the website. And it also is about testing processes.

2. ASP.NET

2.1 Definition

ASP.NET is a unified Web development model that includes the services necessary for you to build enterprise-class Web applications with a minimum of coding.

ASP.NET is part of the .NET Framework, and when coding ASP.NET applications you have access to classes in the .NET Framework. You can code your applications in any language compatible with the common language runtime (CLR), including Microsoft Visual Basic and C#. These languages enable you to develop ASP.NET applications that benefit from the common language runtime, type safety, inheritance, and so on[2].

To be able to develop ASP.NET websites, you have to install Visual Web Developer Express. These components include Visual Web Developer Express, Internet Information Services (IIS), SQL Server Express, and the .NET Framework. All of these are tools that you use to create ASP.NET Web applications. If we don't have any these tools you can't execute your applications. You can also use the Microsoft Web Platform Installer to install open-source ASP.NET applications.

2.2 Information About Development with ASP.NET

After we install all the programs that needed to develop the website, we define our methods and the database kind we are going to use. The language we are going to use which is compatible with asp.net is C#[3].



Figure 2.1 : ASP.NET.

We should install Visual Studio Express for Web 2012 to create the website. As we mentioned before we can find all of this from Microsoft's website for free.

2.3 Development Process

After installing IIS and making sure that we checked all ASP.NET features, we right click My Computer and click Manage to find IIS management page.

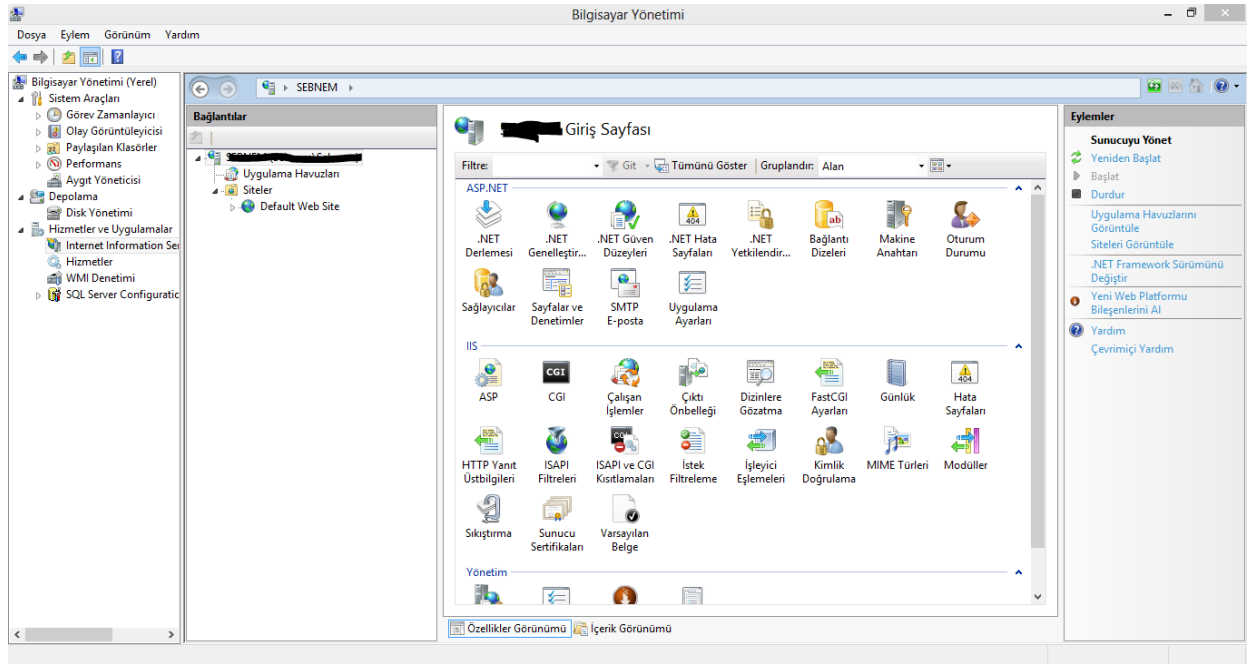


Figure 2.2 : ISS(Internet Information Services).

For the website to work in Localhost we should put website files to the directory that is specified in ISS options which is C:\inetpub\wwwroot. But the directory can be changed. And also if you don't want to install ISS, you can install Visual Studio Express for Web 2012 and it does it for you and website will work no matter which directory it is in.

We open VS for Web 2012 and click File-New Web Site. And then in the Solution Explorer we see websites files and pages. In Figure 2.3 is some of the pages and files of the website.

To add a new page with .aspx extension, right click website's name and click Add New Item. And pick the first option which is Web Form C Sharp. When the page is created like Default.aspx, it also creates Default.aspx.cs. This is where the C Sharp codes will be written.

For example, when you add an aspx button from toolbox and double click on it will go to that button's click event in Default.aspx.cs.

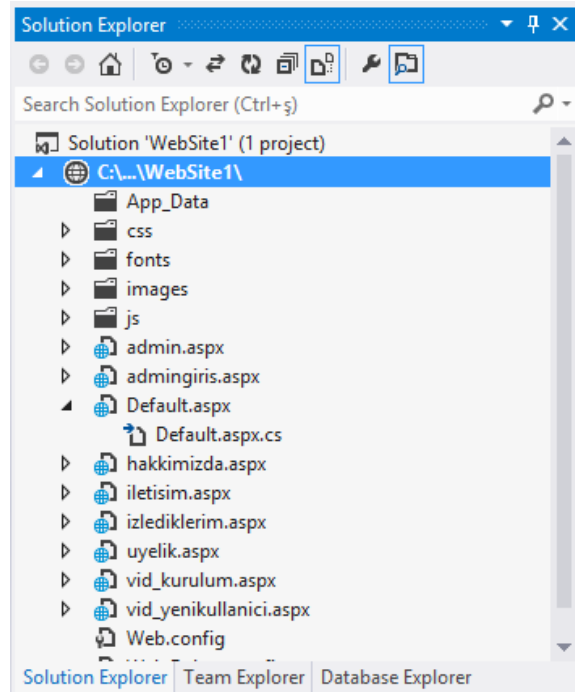


Figure 2.3 : Solution Explorer

In Figure 2.4 we can see the interface of the website. It basically has Home, Oracle Videos, About Us and Contact menus, sign up and sign in pages and information about videos and Oracle DB.

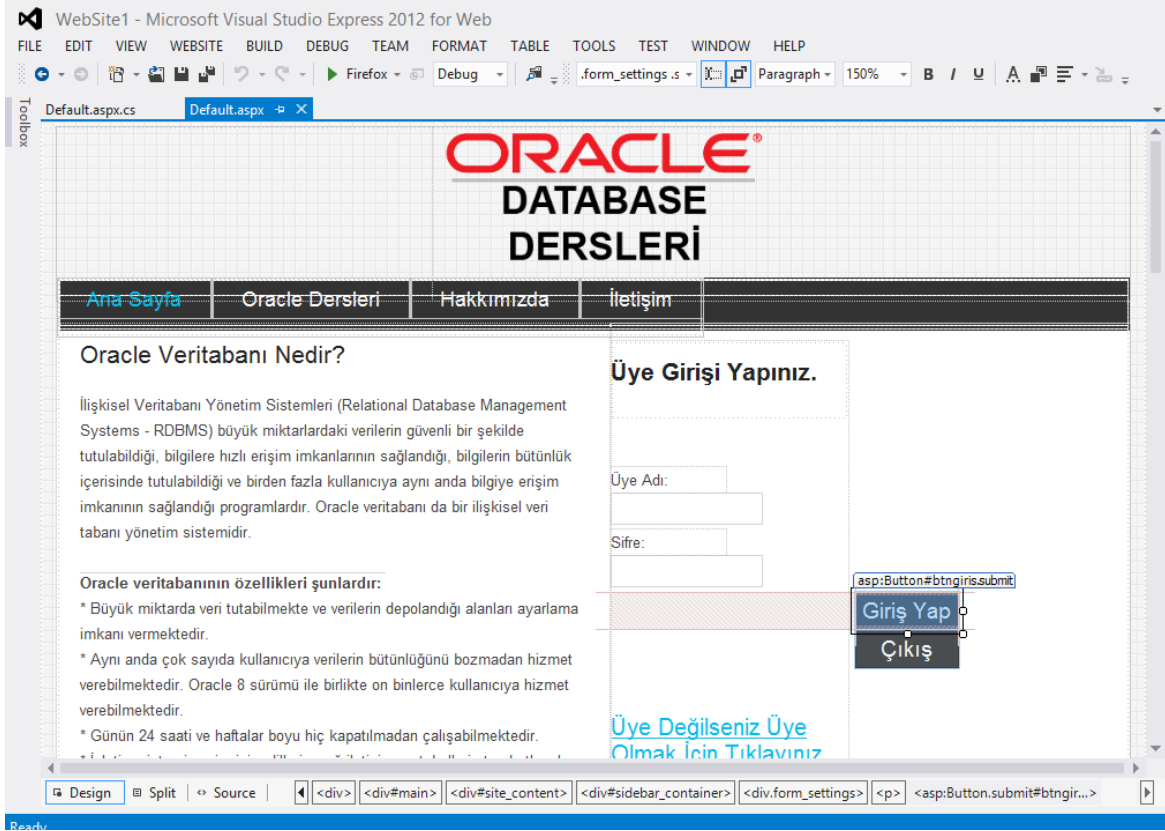


Figure 2.4 : Website's Design

The website consist of a sign up page which shown in Figure 2.5. The function of this page is to sign up to the website and according to your information you can see the last videos you have seen so that you can keep track and will not watch the same ones.



The image shows the sign-up page for 'ORACLE DATABASE DERSLERİ'. The header features the Oracle logo and the site title. A navigation bar includes links for 'Ana Sayfa', 'Oracle Dersleri', 'Hakkımızda', and 'İletişim'. The main content area prompts the user to fill out a form to become a member. The form includes fields for 'Üye Adı', 'Adı', 'Soyadı', 'E-mail Adresi', 'Sifre', and 'Sifreyi Tekrarla'. A 'Üye Ol' button is positioned below the form.

Figure 2.5 : Sign Up Page

After signing in with user name it gives welcome message and Previously Watched Videos Button appears. And when you click it you can see all the videos you clicked before. And if you hit Sign out the button will dissapear. So in order to see it you have to login.



The image shows the login page for 'ORACLE DATABASE DERSLERİ'. It displays a welcome message 'Hoşgeldiniz Sebnem Gokce !'. Below this, there are input fields for 'Üye Adı' and 'Sifre'. Two buttons, 'Giriş Yap' and 'Çıkış', are located below the password field. A link 'Üye Değilseniz Üye Olmak İçin Tıklayınız.' is provided for new users. At the bottom, there is a button 'İzlenen Videolar' for viewing watched videos.

Figure 2.6 : Login Site Page

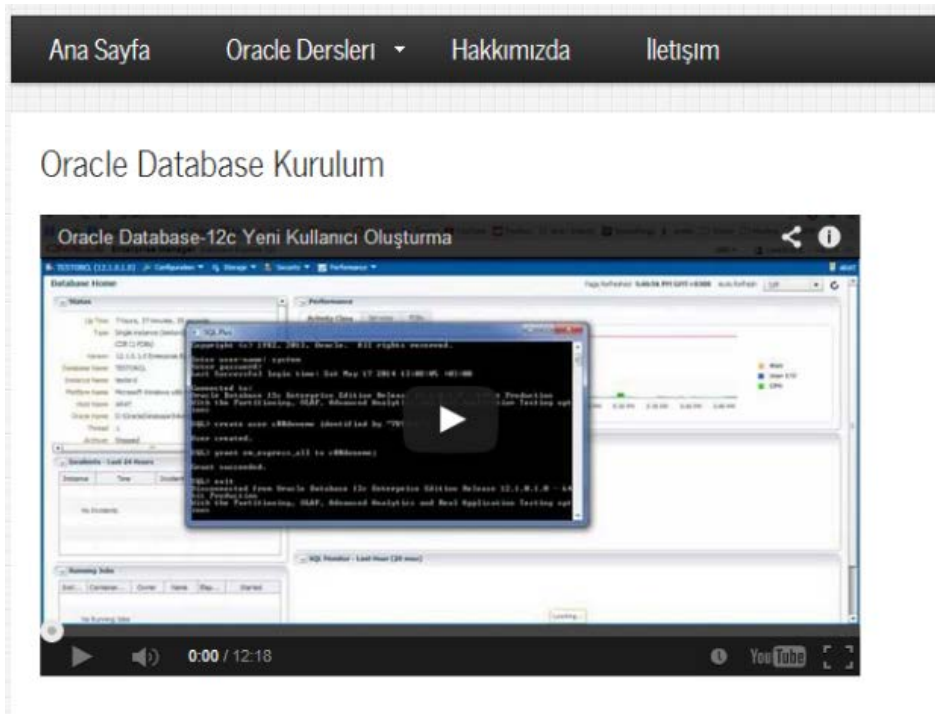


Figure 2.7 : Oracle DB Video Page

In Figure 2.7 showed above is an example of how Youtube videos will look in the website. And below the video, there will also be information about topic that is being told in the video.

Ana Sayfa
Oracle Dersleri
Hakkımızda
İletişim

İletişim

Ad

Soyad

Email Adresi

Mesaj

Gönder

Figure 2.8 : Contact Us Page

3. MSSQL

3.1 Definition

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database, it is a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network (including the Internet). In basic terms, an MS SQL database is capable of storing any type of that you want. It will let you quickly store and retrieve information and multiple web site visitors can use it at one time [4]. You will use SQL statements to accomplish all of this.

3.2 Information About MSSQL Usage

There are at least a dozen different editions of Microsoft SQL Server aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users. Its primary query languages are T-SQL and ANSI SQL. MS SQL is the database of choice for web applications on a Windows platform (using .NET or ASP). These languages make it extremely easy to connect to a MS SQL database. It is also used for many popular content management systems and other scripts. We'll use Microsoft Sql Server Express 2012 and Sql Server Management Studio 2012 to be able to create the database[5].

3.3 How to Integrate it with ASP.NET?

Firstly, we connect to the server. If we specified any password while installing Sql Server we enter the user name and password that we specified but if we did not we pick “Windows Authentication” option and click Connect.

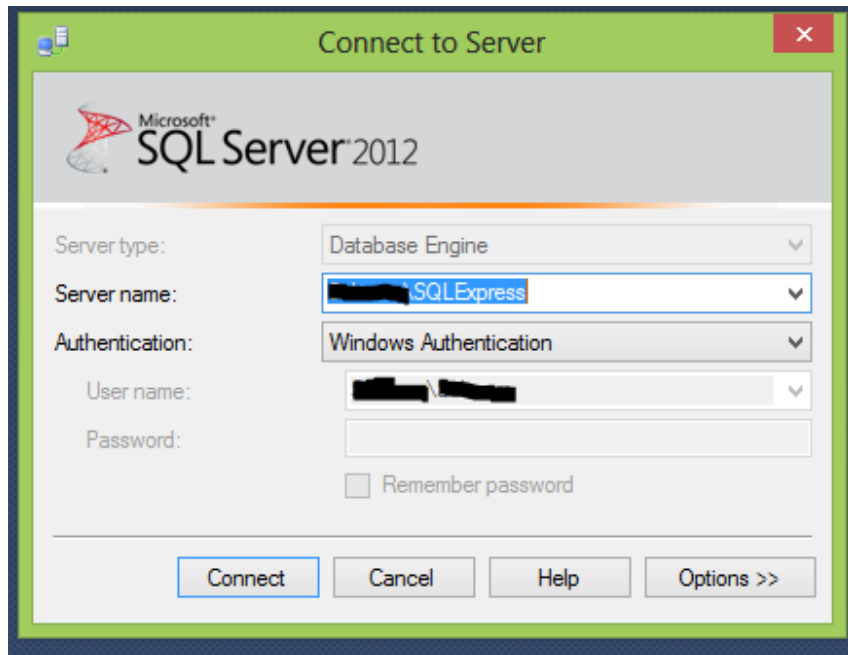


Figure 3.1 : Sql Server Express 2012 – Connect to Server Window[5]

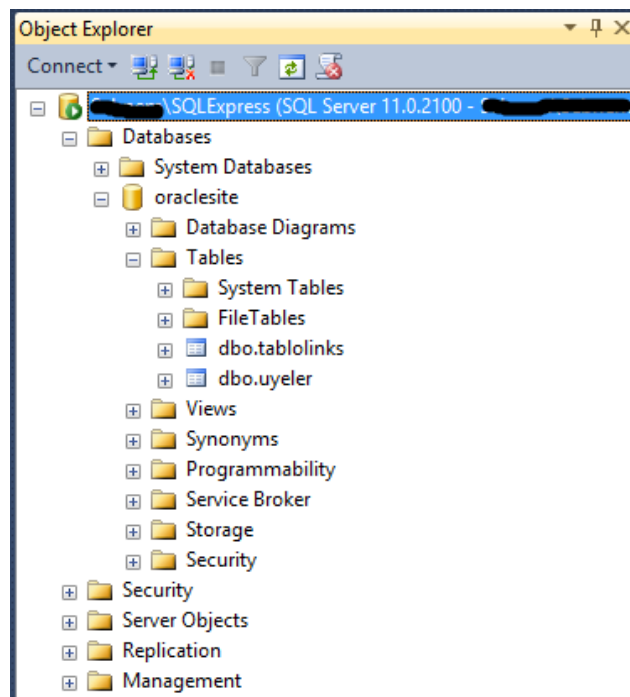
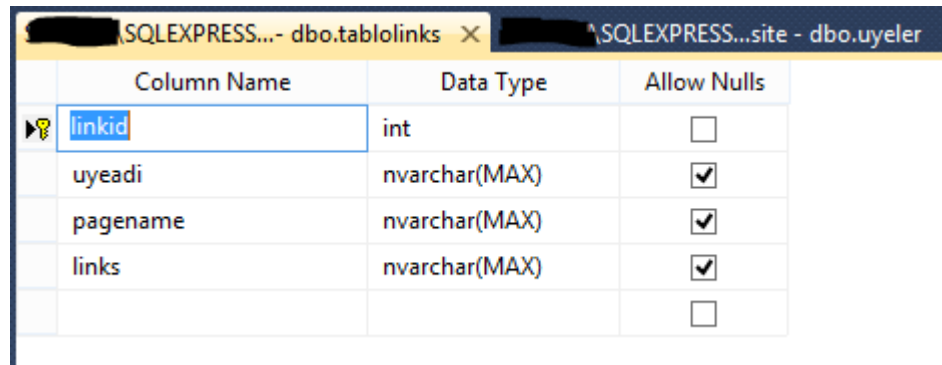


Figure 3.2 : Sql Server – Object Explorer

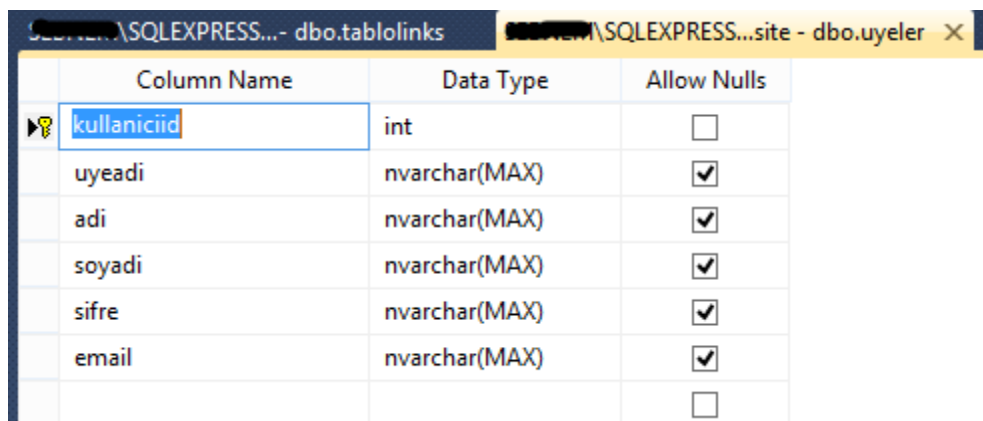
After we connected to Sql Server we right click Databases and pick Create New Database option. We can also do this by clicking New Query option and writing it with T-SQL codes but the point of using MSSQL Management Studio is its ease of use. So we create it with user interface.

After creating the database we right click table in that db and create new table. The columns and data types of them are given below.



Column Name	Data Type	Allow Nulls
linkid	int	<input type="checkbox"/>
uyeadi	nvarchar(MAX)	<input checked="" type="checkbox"/>
pagename	nvarchar(MAX)	<input checked="" type="checkbox"/>
links	nvarchar(MAX)	<input checked="" type="checkbox"/>

Figure 3.3 : Links Table



Column Name	Data Type	Allow Nulls
kullanicIID	int	<input type="checkbox"/>
uyeadi	nvarchar(MAX)	<input checked="" type="checkbox"/>
adi	nvarchar(MAX)	<input checked="" type="checkbox"/>
soyadi	nvarchar(MAX)	<input checked="" type="checkbox"/>
sifre	nvarchar(MAX)	<input checked="" type="checkbox"/>
email	nvarchar(MAX)	<input checked="" type="checkbox"/>
		<input type="checkbox"/>

Figure 3.4 : Uyeler Table

After we finished creating the tables we open Visual Studio Express 2012 for web and go to Database Explorer tab. We click Connect to Database option which is a plug icon.

After we do that Add Connection Window appears.

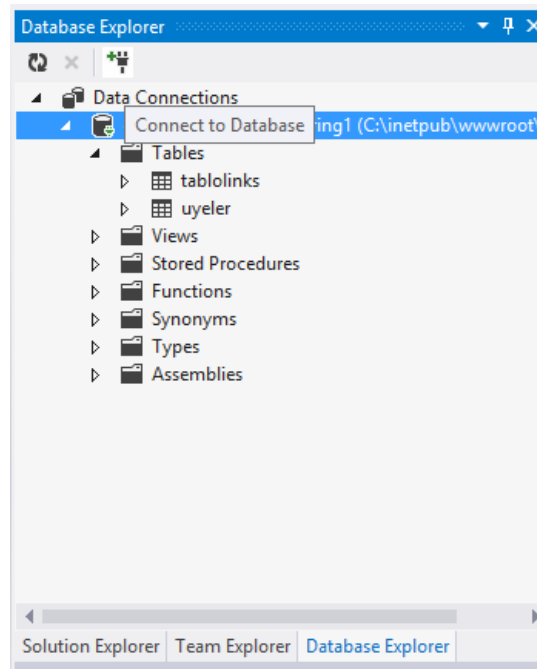


Figure 3.5 : Database Explorer

In Add Connection Window, we to Server Name, we copy the name that we enter while connecting to Sql Server and after we write the name in Select or enter a database name option the name of the database appear. We pick the name of the database we created and click Test Connection. If we succeeded we click OK and we are connected the database to our website

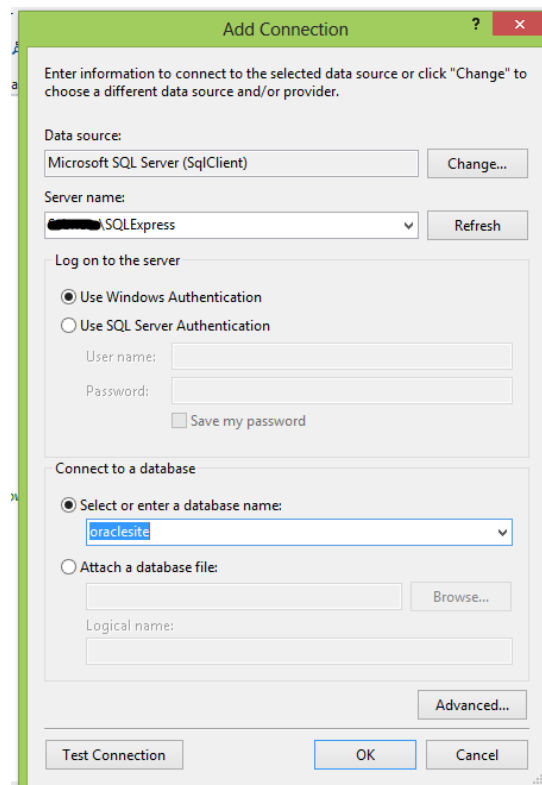


Figure 3.6 : Add Connection Window

To make connection with the database in code we open .cs file that we want to make database connection with and write this lines of code.

```
SqlConnection conn = new SqlConnection("Data Source=ServerName\\SQLEXPRESS;  
Initial Catalog=DatabaseName; Integrated Security=True");
```

```
conn.Open();
```

But only adding these lines to the event that you want to use is not enough. You also have to add the Sql classes to the top of the project.

```
using System.Data.SqlClient;
```

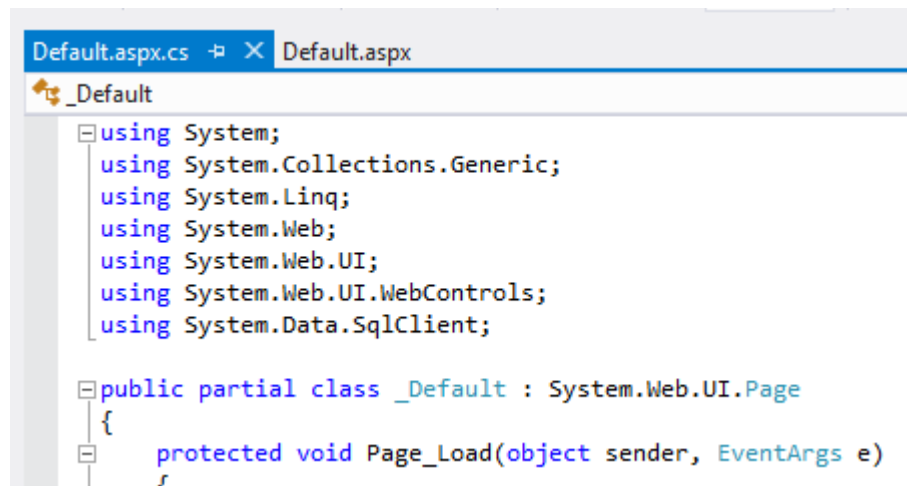


Figure 3.7 : Default.aspx.cs classes

And after that our connection to the database will be completed.

4. ORACLE

4.1 What is Oracle?

Oracle is a U.S. based multinational computer technology corporation headquartered in Redwood City, California, United States. The company specializes in developing and marketing computer hardware systems and enterprise software products – particularly its own brands of database management systems. Oracle is the second-largest software maker by revenue, after Microsoft.

The company also builds tools for database development and systems of middle-tier software, enterprise resource planning (ERP) software, customer relationship management (CRM) software and supply chain management (SCM) software[6].

4.1.1 Information about SUN and Oracle Products

Sun Microsystems, Inc. was a company that sold computers, computer components, computer software, and information technology services and that created the Java programming language, and the Network File System (NFS). Sun significantly evolved several key computing technologies, among them Unix, RISC Processors, Thin Client Computing, and virtualized computing. Sun was founded on February 24, 1982. At its height, Sun headquarters were in Santa Clara, California (part of Silicon Valley), on the former west campus of the Agnews Developmental Center.

On January 27, 2010, Oracle announced it had completed its acquisition of Sun Microsystems a move that transformed Oracle from solely a software company to a manufacturer of both software and hardware for US \$7.4 billion, based on an agreement signed on April 20, 2009. The following month, Sun Microsystems, Inc. was merged with Oracle USA, Inc. to become Oracle America, Inc. The acquisition was delayed for several months by the EU Commission because of concerns about MySQL, but was unconditionally approved in the end. This acquisition was important to some in the open source community and also to some other companies, as they feared Oracle might end Sun's traditional support of open source projects. Since the acquisition, Oracle has discontinued OpenSolaris and StarOffice, and sued Google over their newly acquired Java patents from Sun. In September 2011 a Wikileaks cable was published revealing that the U.S. pressured the E.U. to allow Oracle to acquire Sun.

Sun products included computer servers and workstations built on its own RISC-based SPARC processor architecture as well as on x86 based AMD's Opteron and Intel's Xeon processors; storage systems; and a suite of software products including the Solaris operating system, developer tools, Web infrastructure software, and identity management applications. Other technologies include the Java platform, MySQL, and NFS. Sun was a proponent of open systems in general and Unix in particular, and a major contributor to open source software. Sun's main manufacturing facilities were located in Hillsboro, Oregon and Linlithgow, Scotland[7].

Oracle Products include Applications, Database, Engineered Systems, Enterprise Management, Java, Middleware, Operating Systems, Servers, Storage and Tape, Networking and Data Center Fabric Products, Enterprise Communications, Virtualization[8].

4.1.1.1 Applications

Whether you choose an on-premise or a cloud-based model, Oracle's application strategy is to offer choice and flexibility with the most comprehensive, modern, and secure portfolio of products and services to fit your business needs. Cloud-based SaaS applications can be used to empower employees, ensuring they have access to the data, applications and features they need to do their jobs more effectively. Some of Oracle Applications are Oracle Human Capital Management Cloud, Enterprise Resource Planning Cloud, Customer Experience Cloud, Supply Chain Management Cloud, Supply Chain Cloud, Enterprise Management Cloud.

4.1.1.2 Database

Oracle Databases help customers lower IT costs and deliver a higher quality of service by enabling consolidation onto database clouds and engineered systems like Oracle Exadata and Oracle Database Appliance. Proven to be fast, reliable, secure and easy to manage, Oracle Database 12c is ideally suited for all types of database workloads including enterprise applications, data warehouses, and big data analysis. Some of Oracle Databases are 12c Editions, 11g Editions, 10g Editions.

4.1.1.3 Engineered Systems

Oracle innovates at every layer of the stack to design engineered systems that reduce the cost and complexity of IT infrastructures while increasing productivity and performance. The Oracle Exadata Database Machine, the Exalogic Elastic Cloud, and the Oracle SuperCluster are designed to achieve enterprise performance levels that are unmatched in the industry. Some of Oracle Engineered Systems are Oracle Exadata Database Machine, Oracle SuperCluster, Oracle Virtual Compute Appliance, Oracle Big Data Appliance, Oracle Network Applications Platform, Oracle ZFS Storage Appliance.

4.1.1.4 Enterprise Management

Oracle Enterprise Manager 12c is the only complete management solution for your enterprise cloud. In the cloud, or in traditional IT environments, Oracle Enterprise Manager helps you provision applications faster, reduce time-to-resolution of service requests, and easily manage user experiences for millions of customers. Some of Enterprise Management examples are Cloud Management, Application Management, Middleware Management and Database Management.

4.1.1.5 Java

Java is the foundation for virtually every type of networked application and is the global standard for developing and delivering mobile applications, games, Web-based content, and enterprise software.

4.1.1.6 Middleware

Oracle Fusion Middleware, the #1 application infrastructure foundation available today, consolidates Oracle's leading, standards-based software and tools to provide a comprehensive, service-oriented architecture for the delivery of software applications. It enables enterprises to create and run agile, intelligent business applications while maximizing IT efficiency. Some of Middleware examples are Exalogic, Data Integration, Business Process Management, Service-Oriented Architecture(SOA), WebCenter, Development Tools.

4.1.1.7 Operating Systems

Oracle Solaris, the #1 enterprise UNIX operating system, and Oracle Linux, available with Oracle's Unbreakable Enterprise Kernel, provide high performance, scalability,

and reliability. Both are optimized to run Oracle hardware, databases, and middleware.

4.1.1.8 Servers

Oracle's SPARC, Sun x86, Sun Blade and Sun Netra carrier-grade servers are engineered to deliver record-breaking performance, simplified management, high availability, and cost-saving efficiencies. These industry-leading systems include built-in virtualization and are optimized to run Oracle Solaris, Oracle Linux, Oracle VM, and other leading operating systems to support Oracle and non-Oracle applications and solutions. Some of Oracle Server examples are Sun Blade Servers, Oracle Virtual Compute Appliance, Oracle SuperCuster, Sun Netra carrier-Grade Servers, Sun x86 Systems.

4.1.1.9 Storage and Tape

Oracle's ZFS Storage Appliances, SAN storage, Tape storage, and Flash storage offer unsurpassed capabilities for heterogeneous data centers. These business-ready storage solutions enable enterprises to simplify their IT environments, reduce costs, and rapidly respond to changing business needs. Some of Oracle Storage and Tape examples are NAS Storage, Tape Storage, SAN Storage, Flash Storage.

4.1.1.10 Networking and Data Center Fabric Products

Oracle's networking and data center fabric products help enterprise customers improve infrastructure performance, reduce cost and complexity, and simplify storage and server connectivity. We provide virtual networking products, Ethernet solutions, InfiniBand networking, and storage networking so that you can increase agility and respond to changing business needs. Some of Oracle Networking examples are Oracle Virtual Networking, Ethernet Networking, InfiniBand Networking and Storage Networking.

4.1.1.11 Enterprise Communications

Oracle enables the hyper-connected enterprise with solutions that deliver seamless voice, video, and unified communications across fixed and mobile users. Oracle solutions help businesses engage their customers with rich multimedia interactions and automate business processes to increase productivity, efficiency, and ROI. Some of Enterprise Communications examples are OE (Oracle Enterprise) Session Border

Controller, OE Operations Monitor, OE Communications Broker, OC(Oracle Communications) Application Session Controller, OC Interactive Session Recorder, OC Unified Communications Suite.

4.1.1.12 Virtualization

Oracle offers the industry's most complete and integrated virtualization, from the desktop to the data center. Going far beyond simple consolidation, Oracle enables you to virtualize and manage your full hardware and software stack. Some of Oracle Virtualization examples are Oracle VM Server, Oracle VM VirtualBox.

4.1.2 Information about Oracle Database

Oracle database (Oracle DB) is a relational database management system (RDBMS) from the Oracle Corporation. Originally developed in 1977 by Lawrence Ellison and other developers, Oracle DB is one of the most trusted and widely-used relational database engines. The system is built around a relational database framework in which data objects may be directly accessed by users (or an application front end) through structured query language (SQL). Oracle is fully scalable relational database architecture and is often used by global enterprises, which manage and process data across wide and local area networks. The Oracle database has its own network component to allow communications across networks. Oracle DB is also known as Oracle RDBMS and, sometimes, just Oracle[9].

An Oracle DB is a collection of data treated as a unit. The purpose of a database is to store and retrieve related information. A database server is the key to solving the problems of information management. In general, a server reliably manages a large amount of data in a multiuser environment so that many users can concurrently access the same data. All this is accomplished while delivering high performance. A database server also prevents unauthorized access and provides efficient solutions for failure recovery.

Oracle DB is the first DB designed for enterprise grid computing, the most flexible and cost effective way to manage information and applications. Enterprise grid computing creates large pools of industry-standard, modular storage and servers. With this architecture, each new system can be rapidly provisioned from the pool of

components. There is no need for peak workloads, because capacity can be easily added or reallocated from the resource pools as needed.

The DB has logical structures and physical structures. Because the physical and logical structures are separate, the physical storage of data can be managed without affecting the access to logical storage structures.

Oracle DB rivals Microsoft's SQL Server in the enterprise database market. There are other database offerings, but most of these command a tiny market share compared to Oracle DB and SQL Server. Fortunately, the structures of Oracle DB and SQL Server are quite similar, which is a benefit when learning database administration. Oracle DB runs on most major platforms, including Windows, UNIX, Linux and Mac OS.

4.1.2.1 Database Editions and Options

Oracle Database (12c is Last edition) comes in three editions and features a wide range of enterprise edition options to meet specific customer requirements in the areas of performance and availability, security and compliance, data warehousing and analytics, unstructured data, and manageability.

- Oracle Database Standard Edition One (SE1) delivers unprecedented ease-of-use, power, and price/performance for workgroup, departmental, and web applications on single servers with a maximum of 2 sockets.
- Oracle Database Standard Edition (SE) is available on single or clustered servers with a maximum capacity of four sockets in total. It includes Oracle Real Application Clusters as a standard feature at no additional cost.
- Oracle Database Enterprise Edition (EE) is available on single and clustered servers with no socket limitation. It provides efficient, reliable and secure data management for mission-critical transactional applications, query-intensive data warehouses, and mixed workloads.

Oracle Database 12c introduces a new architecture featuring Oracle Multitenant that simplifies the process of consolidating databases onto the cloud. It delivers all the benefits of managing many databases as one, yet retains the data isolation and resource prioritization of separate database. All editions of Oracle Database 12c are

built using the same code base and are completely compatible with each other. Oracle Database 12c is available on a choice of operating systems and includes a common set of application development tools and programming interfaces. Customers can start out with Standard Edition One, and as business grows or depending on changing requirements, easily upgrade to Standard Edition or Enterprise Edition. It's simple to upgrade -- just install the next edition's software -- you make *no* changes to your database or applications, and get the performance, scalability, reliability, and security for which Oracle is renowned in an easily managed environment[10].

4.1.2.2 Oracle Database Appliance

The Oracle Database Appliance is an engineered system of software, servers, storage, and networking that provides a simple, reliable, and affordable way to deploy, manage, and support high-availability database workloads. The Oracle Database Appliance X4-2 is the 3rd generation of the Oracle Database Appliance. It is an Oracle Engineered System consisting of hardware and software that saves customers time and money by simplifying deployment, maintenance, and support of high availability database solutions. Built using the world's most popular database, Oracle Database, along with Oracle Real Applications Clusters (Oracle RAC), it offers customers a fully integrated system of software, servers, storage and networking that delivers high availability database services for a wide range of custom and packaged OLTP and Data Warehousing workloads[10].

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The Oracle Database Appliance X4-2 ships as a 4 rack unit (RU) system consisting of two x86 servers and one storage shelf. All hardware and software components are provided by Oracle, allowing customers to benefit from streamlined single vendor

support. And, by integrating the hardware and software components to work together, the Oracle Database Appliance X4-2 is engineered to provide a high availability database and application solution that is:

- Simple
- Reliable
- Affordable

4.1.2.3 Data Warehousing

Oracle Database 12c, complete with in-database advanced analytics, introduces new integration, performance, scalability, and analytics capabilities that support data warehouses and big data, providing a fast, cost-effective platform for data warehousing and business intelligence applications[10].

4.1.2.4 High Availability

Keep Your Business Online 24/7, 365 Days a Year. With Oracle Database 12c and Oracle's Maximum Availability Architecture, you can reduce downtime costs by protecting your business from all common causes of planned and unplanned downtime, including human error.

Designing, implementing, and managing a high availability (HA) architecture that achieves all business objectives under real-world constraints is quite difficult. Many technologies and services from different suppliers offer to protect your business from data loss and downtime - who can you trust? Oracle believes that HA encompasses a number of important aspects in addition to the main goal of preventing downtime. Key dimensions of a comprehensive HA architecture includes:

- Data availability: ensuring access to data to prevent business interruption.
- Data protection: preventing data loss that compromises the viability of the business.
- Performance: delivering adequate response time for efficient business operations.
- Cost: reducing deployment, management and support costs to conserve corporate resources.
- Risk: consistently achieving required service levels over a long period of time as the business evolves with no costly surprises or disappointments.

Successful HA begins with understanding the service levels required by the business along each of these dimensions. This guides important decisions on technology and determines the appropriate level of investment in HA architecture. Successful HA solutions achieve service level objectives along each of the above dimensions. They must be flexible because different applications, business functions and groups of users have different service level requirements. They must also be able to quickly adapt because no solution is permanent - requirements evolve as business conditions change.

4.1.2.5 Storage Management

Oracle Database 12c provides cost-effective storage management by automating processes, minimizing costly I/O operations, compressing data, and maximizing the utilization of tiered storage resources for all your enterprise databases.

The amount of data that enterprises are storing and managing is growing rapidly - various industry estimates indicate that data volume is doubling every 2-3 years. The rapid growth of data presents daunting challenges for IT, both in cost and performance. Although the cost of storage keeps declining, fast-growing data volumes make storage one of the costliest elements of most IT budgets. In addition, the accelerating growth of data makes it difficult to meet performance requirements while staying within budget. Information Lifecycle Management (ILM) is intended to address these challenges by storing data in different storage and compression tiers, according to the enterprise's current business and performance needs. This approach offers the possibility of optimizing storage for both cost savings and maximum performance. In Oracle Database 12c, two new ILM-related features have been added to the Advanced Compression Option. Heat Map automatically tracks modification and query timestamps at the row and segment levels, providing detailed insights into how data is being accessed. Automatic Data Optimization (ADO) automatically moves and compresses data according to user-defined policies based on the information collected by Heat Map. Heat Map and ADO make it easy to use existing innovations in Oracle Database Compression and Partitioning technologies, which help reduce the cost of managing large amounts of data, while also improving application and database performance. Together these capabilities help to implement first-class Information Lifecycle Management (ILM) in Oracle Database.

4.1.2.5 Oracle Multitenant

Oracle Multitenant offers a new architecture for consolidating databases on clouds, allowing you to manage many databases as one without application changes, resulting in a fast, scalable, reliable, and secure database platform.

Oracle Multitenant is a new option for Oracle Database 12c Enterprise Edition that helps customers reduce IT costs by simplifying consolidation, provisioning, upgrades, and more. It is supported by a new architecture that allows a container database to hold many pluggable databases. And it fully complements other options, including Oracle Real Application Clusters and Oracle Active Data Guard. An existing database can be simply adopted, with no change, as a pluggable database; and no changes are needed in the other tiers of the application. The benefits of Oracle Multitenant are brought by implementing a pure deployment choice. The following list calls out the most compelling examples.

- High consolidation density. The many pluggable databases in a single container database share its memory and background processes, letting you operate many more pluggable databases on a particular platform than you can single databases that use the old architecture. This is the same benefit that schema-based consolidation brings. But there are significant barriers to adopting schema-based consolidation, and it causes ongoing operating problems. The new architecture removes these adoption barriers and operating problems.
- Rapid provisioning and cloning using SQL. A pluggable database can be unplugged from one container database and plugged into another. Alternatively, you can clone one, within the same container database, or from one container database to another. These operations, together with creating a pluggable database, are done with new SQL commands and take just seconds. When the underlying filesystem supports thin provisioning, many terabytes can be cloned almost instantaneously simply by using the keyword snapshot in the SQL command.
- New paradigms for rapid patching and upgrades. The investment of time and effort to patch one container database results in patching all of its many pluggable databases. To patch a single pluggable database, you simply

unplug/plug to a container database at a different Oracle Database software version.

- Manage many databases as one. By consolidating existing databases as pluggable databases, administrators can manage many databases as one. For example, tasks like backup and disaster recovery are performed at the container database level.
- Dynamic between-pluggable database resource management. Oracle Database 12c Resource Manager is extended with specific functionality to instantly control the competition between the pluggable databases within a container database

4.1.2.6 Big Data

Oracle offers a broad portfolio of products to help you acquire and organize diverse data sources and analyzes them alongside your existing data to find new insights and capitalize on hidden relationships.

4.1.2.7 Database Clouds

Oracle offers a broad portfolio of software and hardware products and services to enable public and private clouds. Oracle has five solutions which are

- Applications(SaaS): Modern cloud applications from Oracle help you reimagine your business, your practices, and your experiences. The best-of-breed SaaS applications in Oracle Cloud are integrated with social, mobile, and analytic capabilities to help you deliver the experiences customers expect, the talent to succeed, and the performance the market demands.
- Platform(PaaS): Oracle Cloud platform as a service (PaaS) helps enterprise IT and independent software vendor (ISV) developers rapidly build and deploy rich applications - or extend Oracle Cloud SaaS apps - using an enterprise-grade cloud platform based on the industry's #1 database and application server.
- Infrastructure(IaaS): Now you can run any workload in the cloud for instant value and productivity for your business. Oracle Cloud infrastructure as a

service (IaaS) offers a set of core capabilities, like elastic compute and storage to help you quickly reach your IT goals.

- **Private Cloud:** Built on a comprehensive portfolio of best-in-class, integrated products and services, Oracle's private cloud supports application-, platform-, and infrastructure-level clouds, with deep visibility into security, regulatory compliance, and service levels.
- **Managed Cloud:** Oracle delivers enterprise-grade, private managed cloud services across its broad portfolio of business applications, middleware, database, and hardware technologies.

4.1.2.8 Database Security

Oracle provides a comprehensive portfolio of security solutions to ensure data privacy, protect against insider threats, and enable regulatory compliance.

- Oracle Audit Vault and Database Firewall
- Oracle Advanced Security
- Oracle Database Vault
- Oracle Label Security
- Oracle Data Masking

4.1.2.9 Oracle Exadata

Oracle Exadata is the only database machine that provides extreme performance for both data warehousing and OLTP applications, making it the ideal platform for consolidating mixed database workloads onto private clouds.

The Oracle Exadata Database Machine is engineered to be the highest performing and most available platform for running Oracle Database. Exadata's modern architecture features scale-out industry-standard database servers, scale-out intelligent storage servers, and an extremely high-speed InfiniBand internal fabric that connects all servers and storage. Unique software algorithms in Exadata implement database intelligence in storage, PCI-based flash, and InfiniBand networking to deliver higher performance and capacity at lower costs than other platforms. Exadata runs all types of database workloads, including online transaction

processing (OLTP), data warehousing, and consolidation of mixed workloads. Simple and fast to implement, the Exadata Database Machine powers and protects your most important databases and is the ideal foundation for a consolidated database cloud.

4.2 Oracle Interfaces

4.2.1 Enterprise Manager

Oracle Enterprise Manager helps private and public cloud service providers deliver cloud services up to ten times faster while freeing up administration resources.

In the modern business environment, many organizations depend on IT to deliver always on systems and mission-critical services. But behind the scenes, IT organizations are coping with more and more complexity than ever before—complexity from growing data volumes, to composite applications, to virtualization and the cloud. Managing all these systems and services 24x7, in a global environment is one monumental challenge and constant battle for IT. In the modern business environment, many organizations depend on IT to deliver always on systems and mission-critical services. But behind the scenes, IT organizations are coping with more and more complexity than ever before—complexity from growing data volumes, to composite applications, to virtualization and the cloud. Managing all these systems and services 24x7, in a global environment is one monumental challenge and constant battle for IT. However help is at hand. Today Oracle Enterprise Manager, Oracle's flagship enterprise-class management solution, helps IT organizations cut through the complexity and brings order to chaos by managing and monitoring the performance and availability of today's enterprise applications and their supporting infrastructure from an end-to-end, top-down, end-user perspective in both enterprise private clouds and traditional environments[11]. There are three key aspects of Oracle Enterprise Manager 12c that help accomplish this:

- Complete Cloud Lifecycle Solution

Oracle Enterprise Manager 12c contains solutions to manage all phases of the building, managing, and consuming an enterprise cloud. Using Oracle Enterprise Manager 12c you can build and manage a rich catalog of cloud services—whether it

is infrastructure as a service, database as a service, or platform as a service, all from a single management console.

- Integrated Cloud Stack Management

Secondly, Oracle Enterprise Manager 12c enables integrated management of the entire cloud stack—all the way from application to disk. Oracle Enterprise Manager 12c helps eliminates much of the integration pains and costs that customers would have to otherwise incur by trying to create a cloud environment by integrating multiple point solutions. Any Systems Integrator (SI) would understand this.

- Business-Driven Clouds

Lastly, Oracle Enterprise Manager 12c enables creation of application-aware and business-driven clouds that have deep insight into applications, business services and transactions. Applications, whether they are packaged or home grown—power your business. Therefore it is critical that an enterprise cloud platform not only be able to run these applications but also have deep business insight and visibility into your most critical transactions and processes. As the leading providers of business applications and the middleware that many of your custom applications are built on top of, Oracle offers a cloud solution that is optimized for business services.

With this in mind, Oracle's approach starts with management capabilities that are built right into applications and infrastructure. Oracle Enterprise Manager 12c provides an integrated and seamless console that gives IT departments better business visibility and comprehensive insight right across the entire cloud stack. This integration enables IT to gain unobstructed views of business transactions and the business-user experience. As a result, IT professionals can focus their efforts where they will have the greatest positive impact on the business.

4.2.2 Oracle SQL Developer

Oracle SQL Developer is a free integrated development environment that simplifies the development and management of Oracle Database. SQL Developer offers complete end-to-end development of your PL/SQL applications, a worksheet for running queries and scripts, a DBA console for managing the database, a reports

interface, a complete data modeling solution, and a migration platform for moving your 3rd party databases to Oracle.

Oracle SQL Developer is a graphical version of SQL*Plus that gives database developers a convenient way to perform basic tasks. You can browse, create, edit, and delete (drop) database objects; run SQL statements and scripts; edit and debug PL/SQL code; manipulate and export (unload) data; and view and create reports. You can connect to any target Oracle database schema using standard Oracle database authentication. Once connected, you can perform operations on objects in the database. You can connect to schemas for selected third-party (non-Oracle) databases, such as MySQL, Microsoft SQL Server, Sybase Adaptive Server, Microsoft Access, and IBM DB2, and view metadata and data in these databases; and you can migrate third-party databases to Oracle[11].

4.2.3 SQL* Plus

SQL*Plus is the most basic Oracle Database utility, with a basic command-line interface, commonly used by users, administrators, and programmers. SQL*Plus is an interactive and batch query tool that is installed with every Oracle Database Server or Client installation. It has a command-line user interface, a Windows Graphical User Interface (GUI) and the iSQL*Plus web-based user interface.

SQL*Plus has its own commands and environment, and it provides access to the Oracle Database. It enables you to enter and execute SQL, PL/SQL, SQL*Plus and operating system commands to perform the following:

- Format, perform calculations on, store, and print from query results
- Examine table and object definitions
- Develop and run batch scripts
- Perform database administration

You can use SQL*Plus to generate reports interactively, to generate reports as batch processes, and to output the results to text file, to screen, or to HTML file for browsing on the Internet. You can generate reports dynamically using the HTML output facility of SQL*Plus, or using the dynamic reporting capability of iSQL*Plus to run a script from a web page[11].

5. Start Oracle Database Development

5.1 Oracle Database 12c Installation

The Oracle Database installation process consists of some steps[12]:

- **Read the release notes:** Read the Oracle Database release notes before you begin the installation. The release notes are available with the platform-specific documentation. The latest version of the release notes is available on Oracle Technology Network at <http://www.oracle.com/technetwork/indexes/documentation/index.html>
- **Review the licensing information:** Although the installation media in your media pack contain many Oracle components, you are permitted to use only those components for which you have purchased licenses.

Oracle Support Services does not provide support for components for which licenses have not been purchased.

- **Plan the installation:** Before starting the installation you have to choose one of oracle edition and check your system properties are your system is available for installation?
- **Install the software:** First you have to download software documents from oracle web site. <http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html>
 1. After downloaded extract the files.
 2. Put together in one folder from extracted folders.
 3. Click setup.exe
 4. Full fill the blanks which installation wants to enter from you.

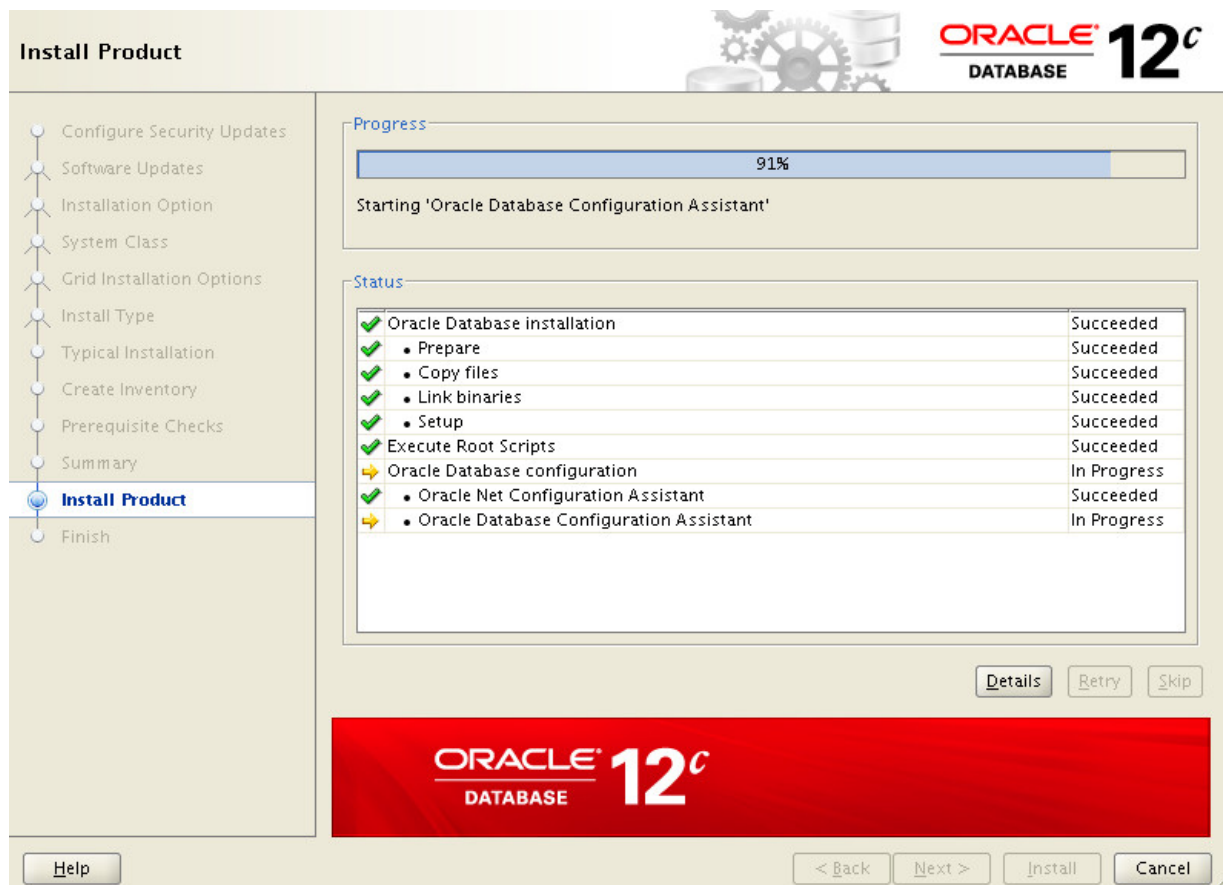


Figure 5.1 Installing Oracle Database

In Figure 5.1 we can see the interface of the installing program.

5.2 Creating User

In Oracle Database 12c you can create user with different three ways. First and easy way is using Enterprise Manager. You can add users to Oracle Enterprise Manager Center from the local authentication subsystem of the Enterprise Controller's operating system. Each user can be given a different role which grants or denies access to the different functions of Oracle Enterprise Manager Center. You can view the existing Users from the Users tab of the Administration section. You can view the Roles of existing users from the Roles tab of the Administration section. Oracle Enterprise Manager Center can import any user known to the Enterprise Controller. These users can log in and launch jobs separately. Each user can be granted different roles, giving them a tailored set of abilities.

Users with admin privileges can add other users to the list of users recognized by Oracle Enterprise Manager Center. New user information, such as the passwords for new users, will be pulled from the local authentication subsystem.

1. Open Oracle Enterprise Manager from <https://localhost:5500/em/> with any internet browser.
2. Logon to system with admin user for example SYS, SYSTEM
3. Click the Users tab. The Users page is displayed.
4. Click the Add User icon. The Add User window is displayed.
5. Give a new user name and password.
6. Give Privilege to that user.
7. Click OK. The new user is created.

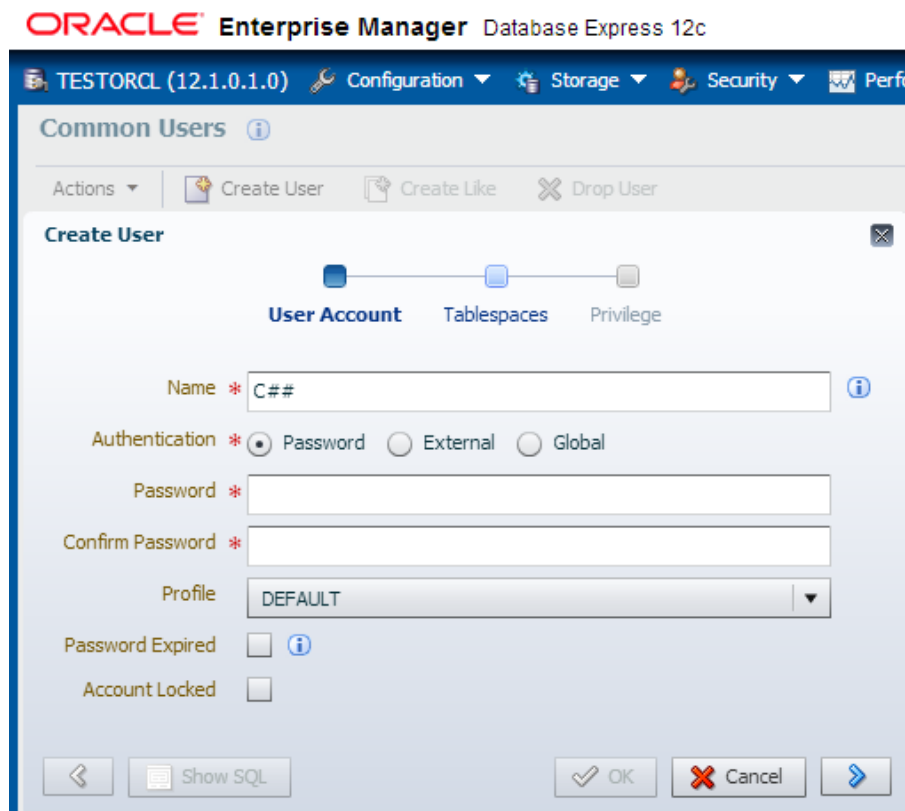


Figure 5.2 Creating User from Enterprise Manager Center

In Figure 5.2 we can see the interface of the Enterprise Manager creating user page.

Another way of creating user is using SQL*Plus. SQL*Plus is an interactive and batch query tool that is installed with every Oracle Database installation. It has a command-line user interface, a Windows Graphical User Interface (GUI) and theiSQL*Plus web-based user interface.

SQL*Plus has its own commands and environment, and it provides access to the Oracle Database. It enables you to enter and execute SQL, PL/SQL, SQL*Plus and operating system commands to perform the following:

- Format, perform calculations on, store, and print from query results
- Examine table and object definitions
- Develop and run batch scripts
- Perform database administration

You can use SQL*Plus to generate reports interactively, to generate reports as batch processes, and to output the results to text file, to screen, or to HTML file for browsing on the Internet. You can generate reports dynamically using the HTML output facility of SQL*Plus, or using the dynamic reporting capability of SQL*Plus to run a script from a web page.

To start the SQL*Plus Windows GUI and connect to a database

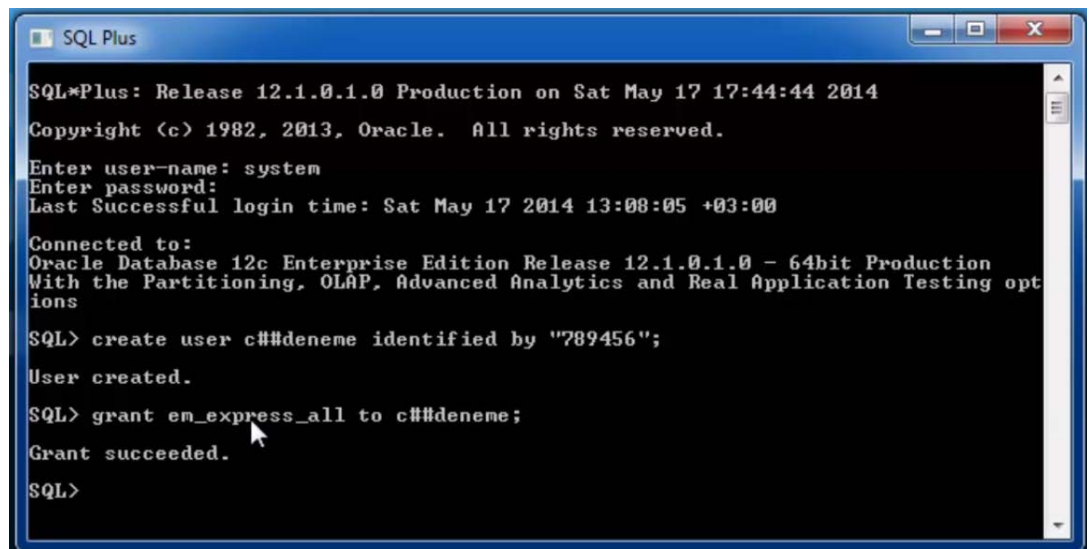
1. Click **Start > Programs > Oracle-OraHomeName > Application Development > SQL Plus**.
2. Alternatively, open a Windows terminal and enter the SQL*Plus command: “sqlplusw”
3. The SQL*Plus Windows GUI opens and the Log On dialog is displayed.

Enter your Oracle Database username and password in the Log On dialog. If you do not know your Oracle Database username and password, ask your Database Administrator.

4. SQL*Plus starts and connects to the database.

Now you can start entering and executing SQL, PL/SQL and SQL*Plus statements and commands at the SQL> prompt.

5. Write `CREATE USER user_namer IDENTIFIED BY <password>;`
6. After creating user you have to authorize to that user for user can login to oracle database system. You need to write:
`GRANT roll_name (for example em_express_basic) to user_name;`



```
SQL*Plus: Release 12.1.0.1.0 Production on Sat May 17 17:44:44 2014
Copyright (c) 1982, 2013, Oracle. All rights reserved.

Enter user-name: system
Enter password:
Last Successful login time: Sat May 17 2014 13:08:05 +03:00

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing opt
ions

SQL> create user c##deneme identified by "789456";
User created.

SQL> grant em_express_all to c##deneme;
Grant succeeded.

SQL>
```

Figure 5.3 Creating User from SQL* Plus

Last and most important way of creating user is using SQL Developer for software engineers.

To start the SQL Developer

1. Click **Start > Programs > Oracle-OraHomeName > Application Development > SQL Developer**.
2. Open Sql Developer, make new connection.
3. Login with System username and password(made during installation).
4. Once you connect, Right click users and add new user.
5. Give its username and password & select appropriate system privilege.
6. You are done now, check by making new connection.

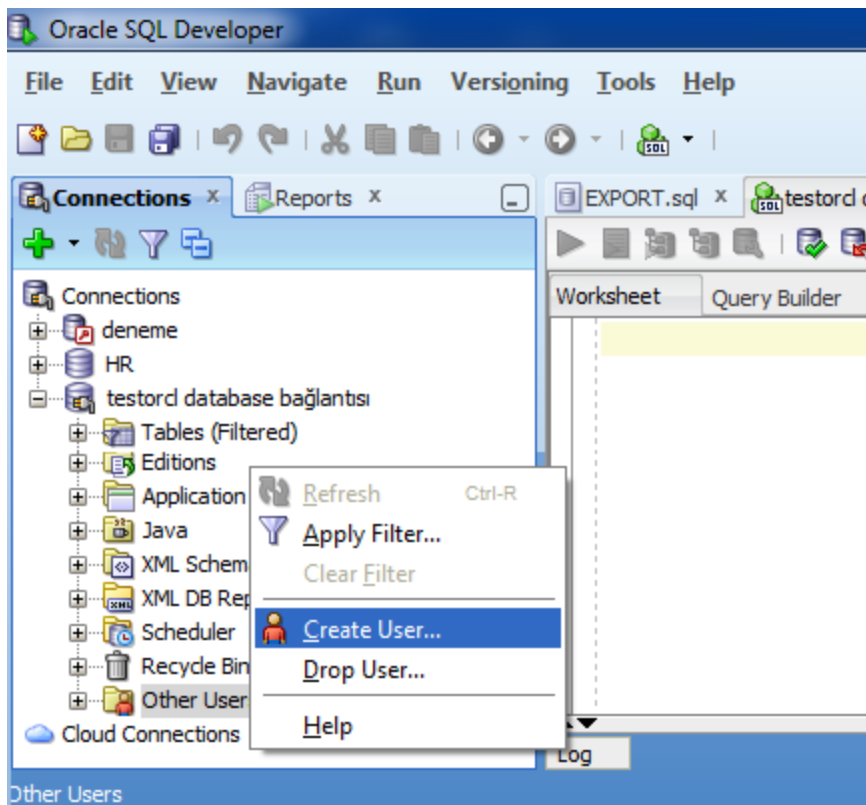


Figure 5.4 Creating User from SQL Developer

In SQL Developer you can create user like SQL* Plus with writing commands.

After connect the system click new button and choose “SQL File”, then write
 CREATE USER user_namer IDENTIFIED BY “password”

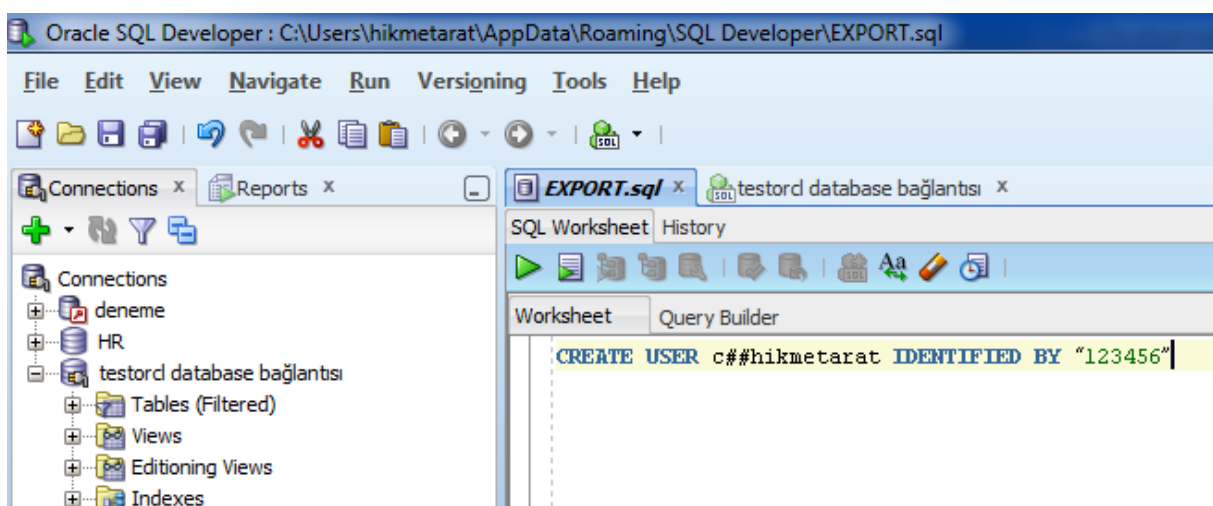


Figure 5.5 Creating User from SQL Developer with writing command

5.3 Creating New Connection

Oracle SQL Developer enables developers and DBAs to browse, create, and update data in a database. Before you can perform those actions, however, you must create at least one database connection an Oracle SQL Developer object containing the information needed to connect to a specific database as a specific user.

Oracle SQL Developer to be running on your local machine. For some examples, you need access to a running local or remote Oracle Database instance with the sample HR schema (available in the default database installation). Other examples require access to an Oracle Internet Directory server or a third-party database[13].

1. Basic Connections

You can connect to a local or remote Oracle Database instance by using the Basic connection type. Basic connections do not require any other Oracle software to be installed on your machine you don't need an Oracle home.

Right-click the Connections node in Oracle SQL Developer's Connections Navigator, and click New Connection to open the New / Select Database Connection dialog box. All of this column's connection examples start from this dialog box.

To create a basic connection for the HR schema, follow these steps:

1. Enter HR_ORCL for Connection Name . The connection name is an arbitrary alias; conventionally, it's a combined username and database name.
2. Enter hr for Username , and enter the hr password in the Password field. (If you check the Save Password box, the password will be stored as an encrypted file on your local machine.)
3. Select Basic from the Connection Type list.
4. Provide information for the following settings:

Role: This is the set of privileges to be associated with the connection. Accept default for this connection.

OS Authentication: Leave this unchecked for this connection.

Proxy Connection: Leave this unchecked for this connection.

Hostname: This is the host system for the Oracle Database instance. Enter an IP address, a machine name, or localhost (when connecting to a database on the same machine as Oracle SQL Developer). The default is localhost .

Port: This is the listener port for the database. The default port for Oracle Database is 1521.

SID: This is the system identifier, such as orcl (the default for Oracle Database 10g, 11g and 12c) or xe (the default for Oracle Database 10g Express Edition). My SID is testordcl because I gave this name when I install oracle database.

Service name: This is the network service name of the database. Select either SID or Service name.

5. Click Test to validate the new connection. Figure 1 shows the dialog box after the connection has validated successfully.

6. If your test reports "Status: Success," click Connect . Oracle SQL Developer will save the new connection, close the dialog box, and connect to the database. (If you click Save instead of Connect , you will be able to create more new connections in the dialog box before connecting.)

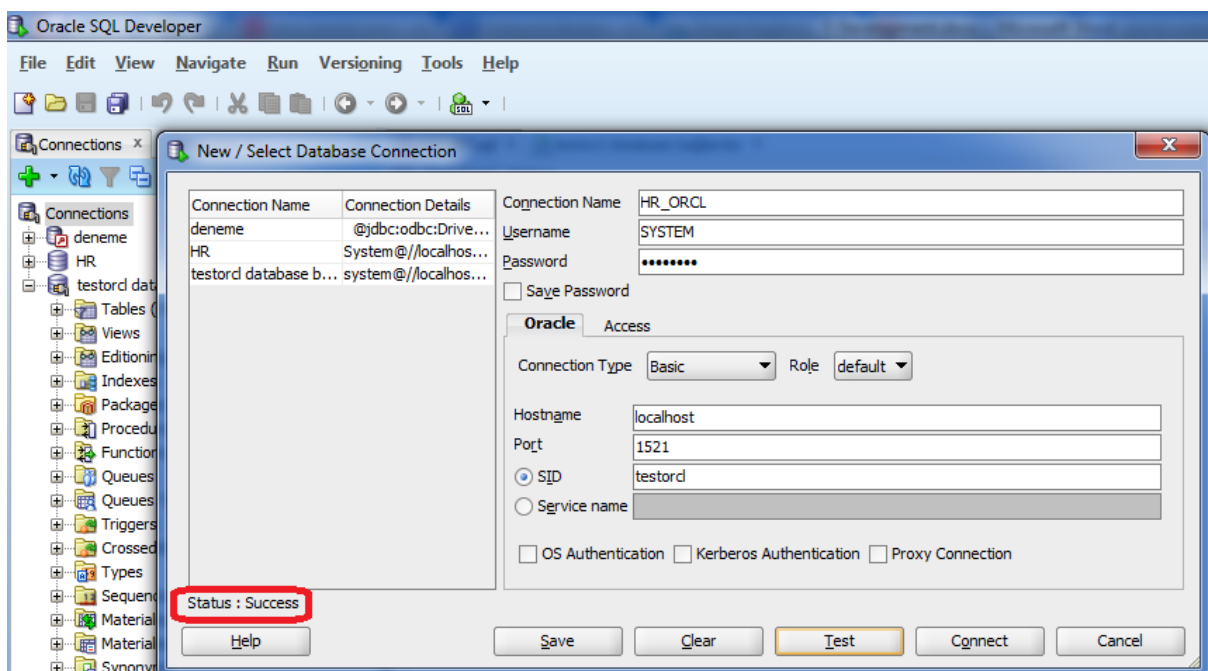


Figure 5.6 Creating New Connection

Now HR_ORCL appears in Connections Navigator, and you can expand it to browse the database.

2. Connecting to Third-Party Databases

Oracle SQL Developer supports browsing and reviewing data and objects in Microsoft Access, MySQL, Microsoft SQL Server, and Sybase. It also offers a SQL worksheet for ANSI SQL commands to update or create objects for these databases. Users who want to migrate from third-party databases to Oracle Database can use the Oracle SQL Developer Migration Workbench. For any of these situations, you need to create a connection to your third-party database.

Installing third-party drivers. The correct third-party driver must be installed before you can create the connection. You can install third-party drivers either manually or by using Check for Updates (Help->Check for Updates). For manual installation, you can download supported drivers from the following locations:

MySQL JDBC driver, version 5.0.8: dev.mysql.com/downloads/connector/j/5.0.html.

jTDS driver, version 1.2 (required by Microsoft SQL Server and Sybase): sourceforge.net/project/showfiles.php?group_id=33291. (See jtds.sourceforge.net for information about this driver.)

Microsoft Access does not require an additional driver, because it uses a JDBC/ODBC bridge.

After downloading the driver you need, expand the driver binary Java Archive (JAR) file, which is typically inside the downloaded archive file:

The `mysql-connector-java-5.0.8.tar.gz` (or `.zip`) download for MySQL includes `mysql-connector-java-5.0.8-bin.jar`.

The `jtds-1.2-dist.zip` file for Microsoft SQL Server and Sybase includes `jtds-1.2.jar`.

Select Tools -> Preferences -> Database -> Third Party JDBC Drivers . Click Add Entry , and add your specific JAR file. Now you can create a connection for your third-party database.

Creating a Microsoft Access connection. To create a connection for Microsoft Access, follow these steps in the New / Select Database Connection dialog box:

1. Enter a connection name.
2. Click the Access tab.
3. Click Browse to locate the .mdb file you want to work with.
4. Click Connect.

You can now expand and browse the new Microsoft Access connection in the Connections Navigator.

Creating a Microsoft SQL Server, Sybase, or MySQL connection. To create a connection to a Microsoft SQL Server, Sybase, or MySQL database in the New / Select Database Connection dialog box, follow these steps:

1. Enter a connection name, username, and password.
2. Click the SQL Server, Sybase , or MySQL tab.

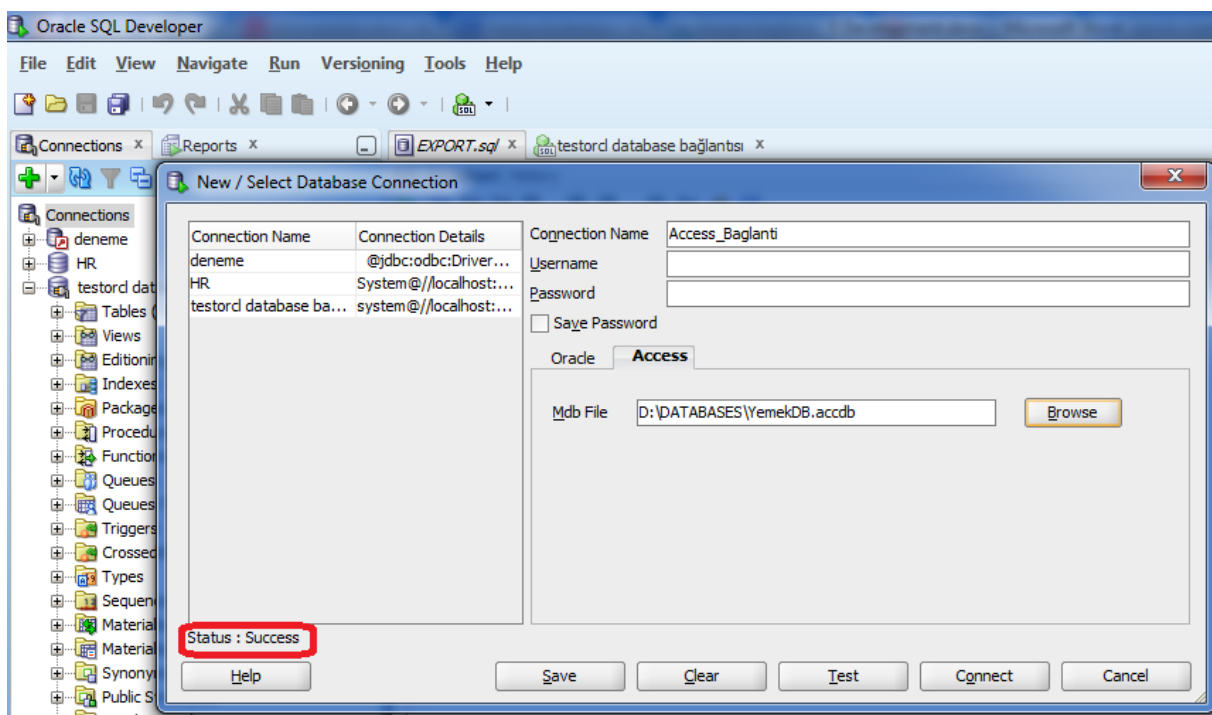


Figure 5.7 Creating New Connection(Third-Part Databases)

5.4 SQL Command Types

SQL (Structured Query Language) is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS).

Originally based upon relational algebra and tuple relational calculus, SQL consists of a data definition language and a data manipulation language. The scope of SQL includes data insert, query, update and delete, schema creation and modification, and data access control[14].

The lists in the following sections provide a functional summary of SQL statements and are divided into these categories:

- DDL (Data Definition Language)
- DML (Data Manipulation Language)
- DQL (Data Query Language)
- DCL (Data Control Language)
- Data administration commands
- Transactional control commands

5.4.1 DDL(Data Definition Language)

The Data Definition Language (DDL) is used to create and destroy databases and database objects. These commands will primarily be used by database administrators during the setup and removal phases of a database project. Some of DDL commands are CREATE TABLE, ALTER TABLE, DROP TABLE, CREATE INDEX, ALTER INDEX, DROP INDEX, CREATE VIEW and DROP VIEW[15]

5.4.2 DML (Data Manipulation Language)

The Data Manipulation Language (DML) is used to retrieve, insert and modify database information. These commands will be used by all database users during the routine operation of the database. Some of DML commands are INSERT, UPDATE and DELETE[15].

5.4.3 DQL (Data Query Language)

The Data Query Language is used to extract data from the database. It doesn't modify any data in the database. It describes only one query: `SELECT`[15].

5.4.4 DCL (Data Control Language)

The Data Control Language is used to create privileges to allow users access to, and manipulation of, the database. In the Oracle database, executing a DCL command issues an implicit commit. Hence you cannot roll back the command[15]. Examples of DCL commands include:

- `GRANT` to allow specified users to perform specified tasks.
- `REVOKE` to cancel previously granted or denied permissions.

5.4.5 Data administration commands

The types of users and their roles and responsibilities depend on the database site. A small site can have one database administrator who administers the database for application developers and users. A very large site can find it necessary to divide the duties of a database administrator among several people and among several areas of specialization[15].

Each database requires at least one database administrator (DBA). An Oracle Database system can be large and can have many users. Therefore, database administration is sometimes not a one-person job, but a job for a group of DBAs who share responsibility.

A database administrator's responsibilities can include the following tasks:

- Installing and upgrading the Oracle Database server and application tools
- Allocating system storage and planning future storage requirements for the database system
- Creating primary database storage structures (tablespaces) after application developers have designed an application
- Creating primary objects (tables, views, indexes) once application developers have designed an application
- Modifying the database structure, as necessary, from information given by application developers
- Enrolling users and maintaining system security

- Ensuring compliance with Oracle license agreements
- Controlling and monitoring user access to the database
- Monitoring and optimizing the performance of the database
- Planning for backup and recovery of database information
- Maintaining archived data on tape
- Backing up and restoring the database
- Contacting Oracle for technical support

Easily such as setting root password, changing root password, monitoring mysql processes, reloading privileges, checking server status etc.

5.4.6 Transactional Control Commands

A Transaction Control Commands is a computer language and a subset of SQL, used to control transactional processing in a database. A transaction is logical unit of work that comprises one or more SQL statements, usually a group of Data Manipulation Language statements[15].

Examples of TCL commands include:

- COMMIT to apply the transaction by saving the database changes.
- ROLLBACK to undo all changes of a transaction.
- SAVEPOINT to divide the transaction into smaller sections. It defines breakpoints for a transaction to allow partial rollbacks.

Import, Export Database

The Export and Import utilities provide a simple way for you to transfer data objects between Oracle databases, even if they reside on platforms with different hardware and software configurations.

When you run Export against an Oracle database, objects (such as tables) are extracted, followed by their related objects (such as indexes, comments, and grants), if any. The extracted data is written to an export dump file. The Import utility reads the object definitions and table data from the dump file.

An export file is an Oracle binary-format dump file that is typically located on disk or tape. The dump files can be transferred using FTP or physically transported (in the case of tape) to a different site. The files can then be used with the Import utility to transfer data between databases that are on systems not

connected through a network. The files can also be used as backups in addition to normal backup procedures.

Export dump files can only be read by the Oracle Import utility. The version of the Import utility cannot be earlier than the version of the Export utility used to create the dump file.

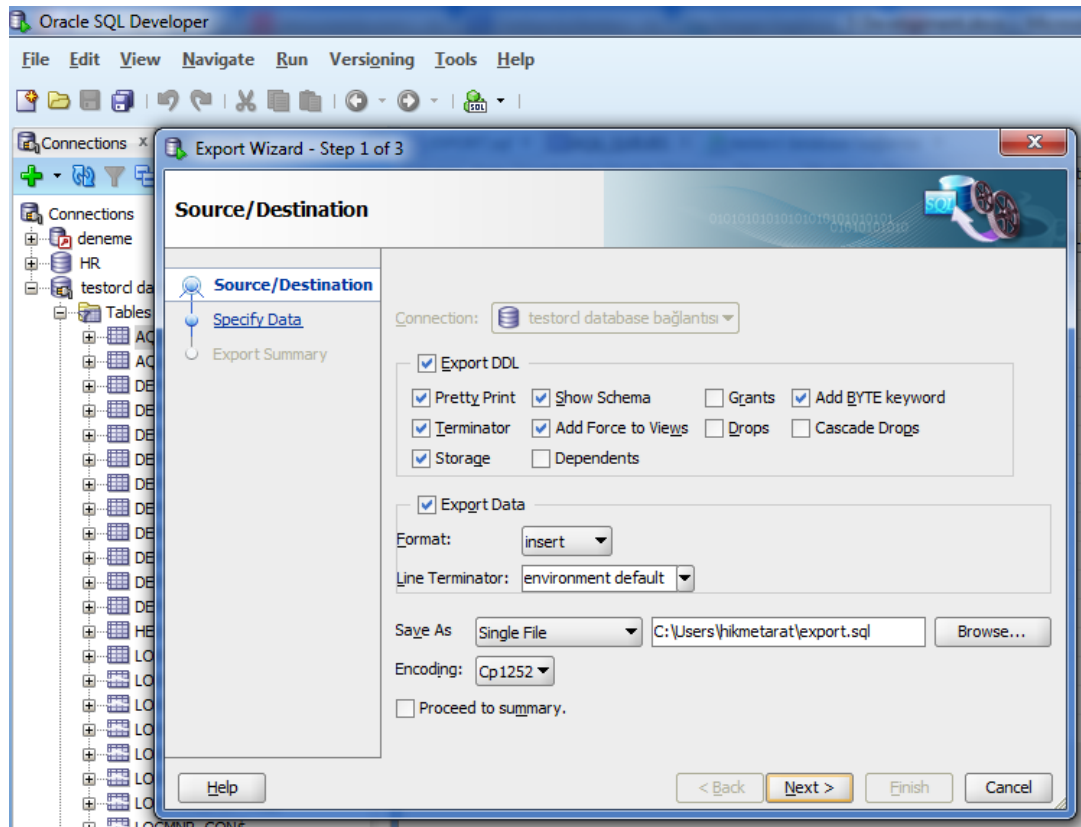


Figure 5.8 Export Database table

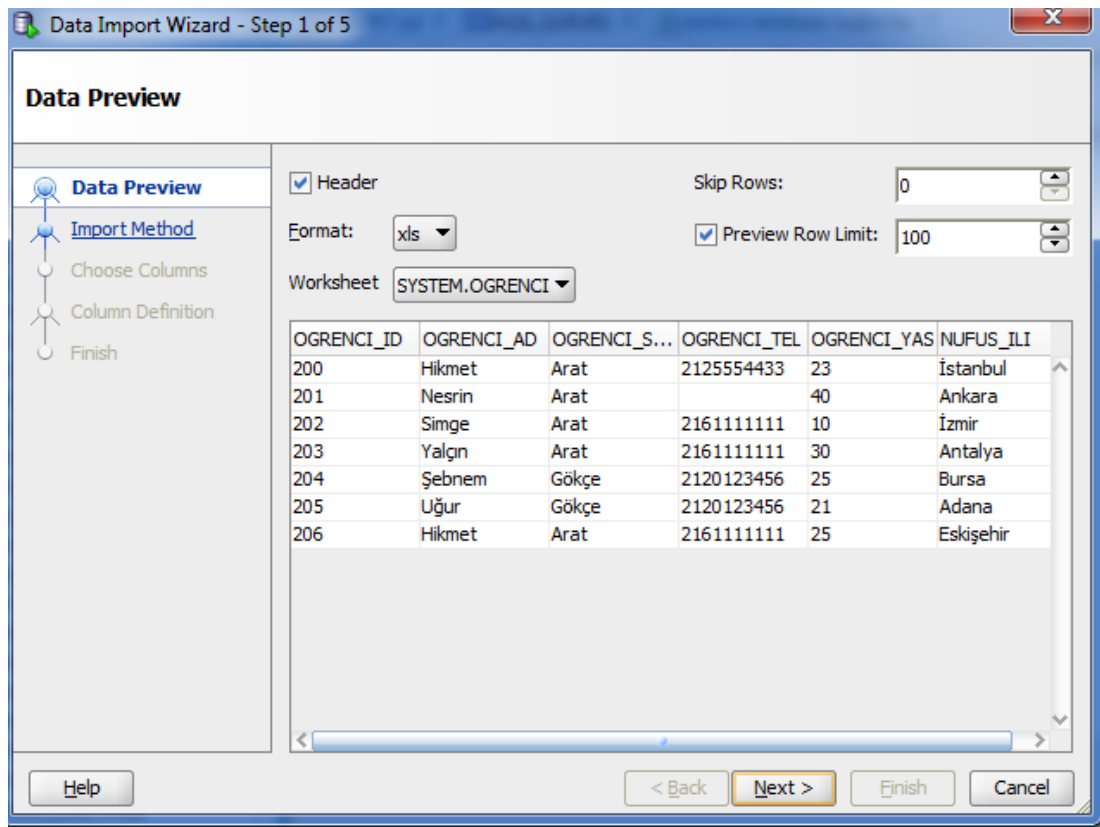


Figure 5.9 Import table to DB

5.5 Error Codes

Error codes may appear while using products that are part of the Oracle Database. Each message listing in the manual contains the message statement, an explanation of the probable causes of the message, and a recommended action. If the message is a warning or indicates that an error occurred, then the message listing indicates a corrective action[16]. Some of error codes are:

- ORA-00901: invalid CREATE command
- ORA-00001 Unique constraint violated.
- ORA-00600 Internal error
- ORA-00942 Table or view does not exist
- ORA-01017 Invalid Username/Password
- ORA-01031 Insufficient privileges
- ORA-01033 ORACLE initialization or shutdown in progress
- ORA-01403 No data found
- ORA-01555 Snapshot too old
- ORA-03113 End-of-file on communication channel
- ORA-03114 Not connected to ORACLE
- ORA-12154 TNS:could not resolve service name
- ORA-12203 TNS:unable to connect to destination
- ORA-12500 TNS:listener failed to start a dedicated server process

- ORA-12545 Connect failed because target host or object does not exist
- ORA-12560 TNS:protocol adapter error

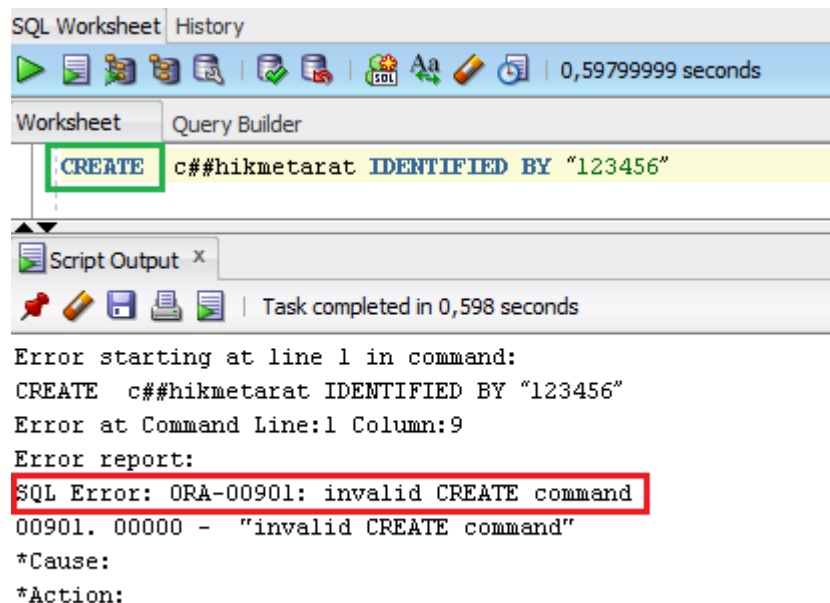


Figure 5.10 An example of error code

5.6 Procedures, Functions and Triggers

5.6.1 Procedures and Functions

You already know how to interact with the database using SQL, but it is not sufficient for building enterprise applications. PL/SQL is a third generation language that has the expected procedural and namespace constructs, and its tight integration with SQL makes it possible to build complex and powerful applications.

Because PL/SQL is executed in the database, you can include SQL statements in your code without having to establish a separate connection.

The main types of program units you can create with PL/SQL and store in the database are standalone procedures and functions, and packages. Once stored in the database, these PL/SQL components, collectively known as stored procedures, can be used as building blocks for several different applications.

While standalone procedures and functions are invaluable for testing pieces of program logic, Oracle recommends that you place all your code inside a package. Packages are easier to port to another system, and have the additional benefit of qualifying the names of your program units with the package name. For example, if you developed a schema-level procedure called continue in a previous version of

Oracle Database, your code would not compile when you port it to a newer Oracle Database installation. This is because Oracle recently introduced the statement `CONTINUE` that exits the current iteration of a loop and transfers control to the next iteration. If you developed your procedure inside a package, the procedure `package_name.continue` would have been protected from such name capture.

With Oracle Database, you can store programs in the database, so commonly used code can be written and tested once and then accessed by any application that requires it. Program units that reside in the database also ensure that when the code is invoked the data is processed consistently, which leads to ease and consistency of the application development process.

Schema-level, or standalone subprograms such as functions (which return a value) and procedures (which do not return a value) are compiled and stored in an Oracle Database. Once compiled, they become **stored procedure** or **stored function** schema objects, and can be referenced or called by any applications connected to Oracle Database. At invocation, both stored procedures and functions can accept parameters[17].

Procedures and functions follow the basic PL/SQL block structure, which consists of the following elements:

- A declarative part, sometimes starting with the keyword `DECLARE`, identifies variables and constants used in the application logic. This part is optional.
- An executable part, starting with `BEGIN` and ending with `END`, contains the application logic. This part is mandatory.
- An exception-handling part, starting with `EXCEPTION`, handles error conditions that may be raised in the executable part of the block. This part is optional.

The general form of a PL/SQL block follows. Note also that each stored program unit has a header that names the unit and identifies it as either a function, procedure, or a package.

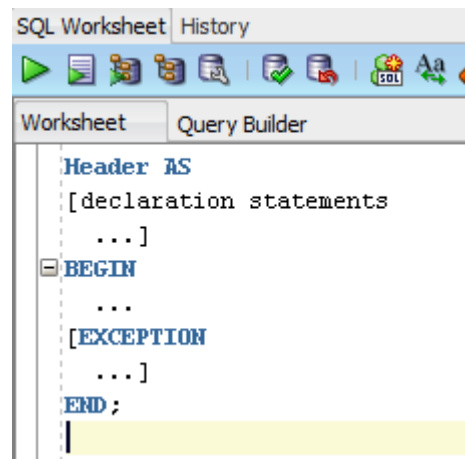


Figure 5.11 SQL Block

The SQL statements for creating procedures and functions are CREATE PROCEDURE and CREATE FUNCTION, respectively. In practice, it is best to use a CREATE OR REPLACE statement. The general form of these statements follows.

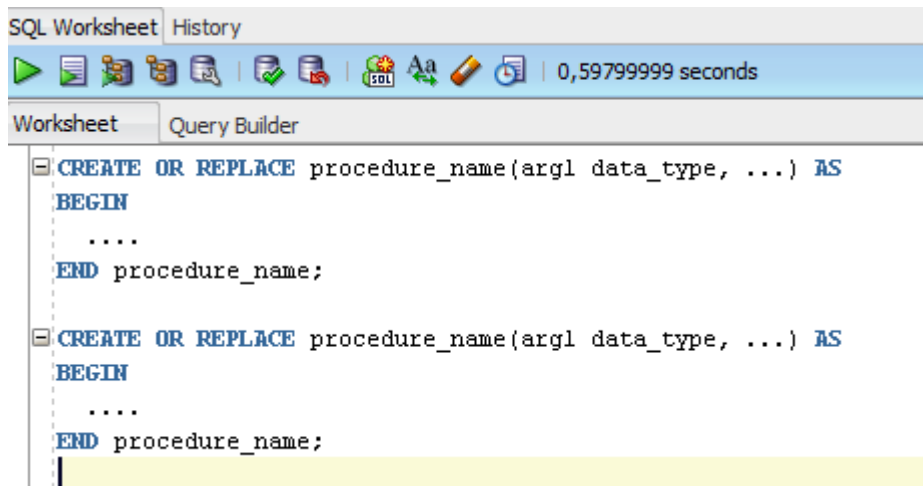


Figure 5.12 Create Procedure with writing command

To create a procedure:

You will create a procedure add_evaluation that creates a new row in the evaluations table.

1. In the Connections navigation hierarchy, right-click **Procedures**.
2. Select **New Procedure**.

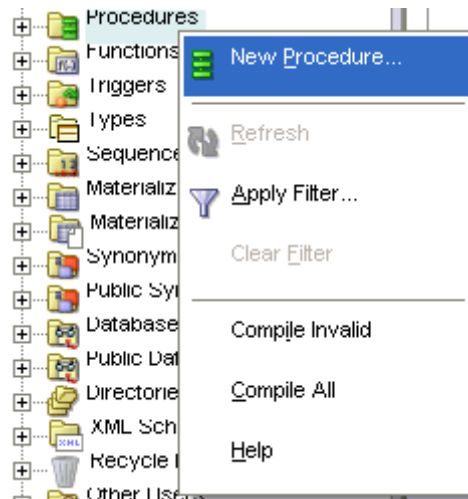


Figure 5.13 New Procedures

3. In the New Procedure window, set the following parameters:

- Ensure that Schema is set to HR.
- Set Name to ADD_EVALUATION.

In the Parameters tab, click the Add Column icon ('plus' sign) and specify the first parameter of the procedure. Set Name to eval_id, set Type to NUMBER, set Mode to IN, and leave Default Value empty.

Similarly, add the following parameters, in this order:

- employee_id: set Type to NUMBER, set Mode to IN, and leave Default Value empty.
- evaluation_date: set Type to DATE, set Mode to IN, and leave Default Value empty.
- job_id: set Type to VARCHAR2, set Mode to IN, and leave Default Value empty.
- manager_id: set Type to NUMBER, set Mode to IN, and leave Default Value empty.
- department_id: set Type to NUMBER, set Mode to IN, and leave Default Value empty.

Click **OK**.

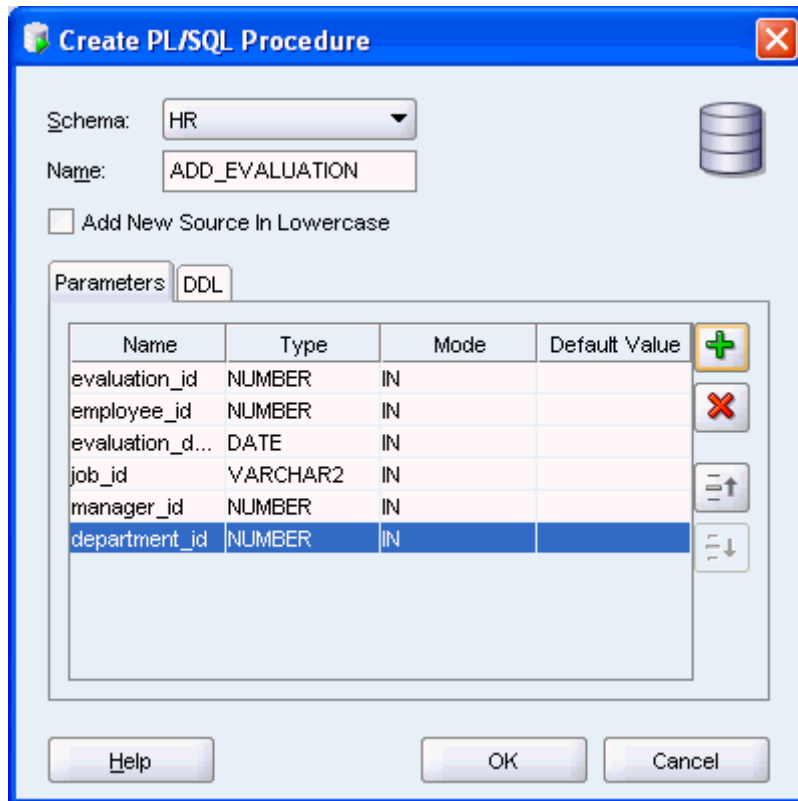


Figure 5.14 Create PL/SQL Procedure

4. The ADD_EVALUATION pane opens with the following code.

Note that the tile of the pane is in italic font, which indicates that the procedure is not saved in the database.

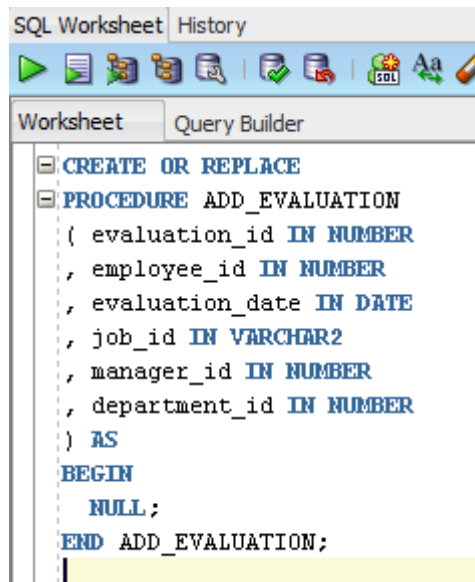
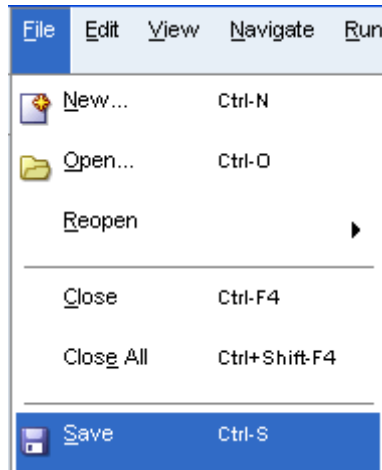


Figure 5.15 Codes of Create PL/SQL Procedure

5. From the **File** menu, select **Save** to save the new procedures. Alternatively, use the **CTRL + S** key combination.

Note that Oracle Database automatically compiles procedures prior to saving them.



Note that the tile of the add_evaluation pane is in regular font, not italic; this indicates that the procedure is saved to the database

To create a function:

You will create a new function `calculate_score`, which calculates the weighted score based on the performance in a particular category.

1. In the Connections navigation hierarchy, right-click **Functions**.
2. Select **New Function**.

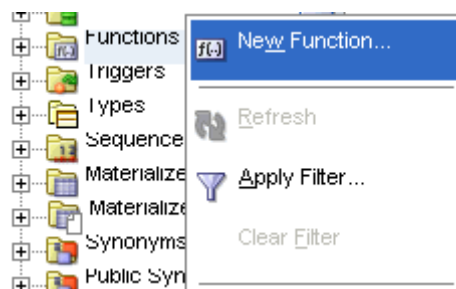


Figure 5.16 Create Function(1)

3. In the New Function window, set the following parameters:
 - Ensure that Schema is set to HR.
 - Set Name to `CALCULATE_SCORE`.

In the Parameters pane, set the <return> Type to NUMBER.

Similarly, add the following parameters, in this order:

- cat: set Type to VARCHAR2, set Mode to IN, and leave Default Value empty.
- score: set Type to NUMBER, set Mode to IN, and leave Default Value empty
- weight: set Type to NUMBER, set Mode to IN, and leave Default Value empty

Click **OK**.

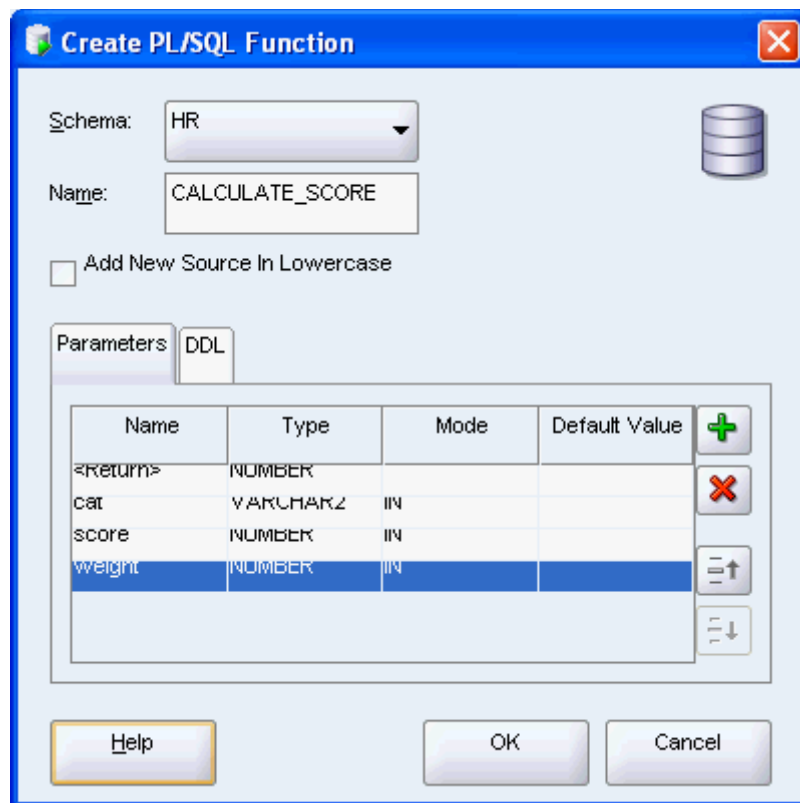


Figure 5.17 Create Function(2)

4. The calculate_score pane opens with the following code.

Note that the tile of the pane is in italic font, which indicates that the procedure is not saved in the database.

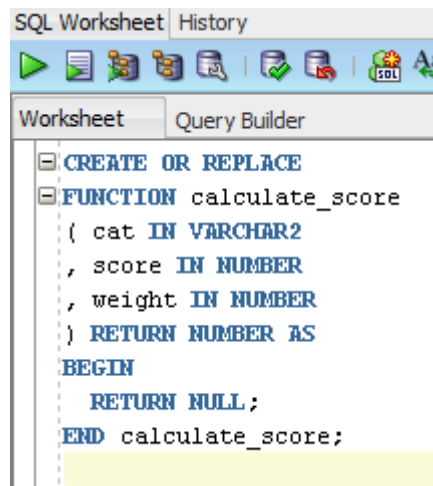


Figure 5.18 Create Function with writing commands

5. From the **File** menu, select **Save** to save the new function. Alternatively, use the **CTRL + S** key combination.

Note that Oracle Database automatically compiles functions prior to saving them.

Note that the tile of the calculate_score pane is in regular font, not italic; this indicates that the procedure is saved to the database

5.6.2 Trigger

Like a stored procedure, a trigger is a named PL/SQL unit that is stored in the database and can be invoked repeatedly. Unlike a stored procedure, you can enable and disable a trigger, but you cannot explicitly invoke it. While a trigger is enabled, the database automatically invokes it—that is, the trigger fires—whenever its triggering event occurs. While a trigger is disabled, it does not fire[18].

You create a trigger with the **CREATE TRIGGER** statement. You specify the triggering event in terms of triggering statements and the item on which they act. The trigger is said to be created on or defined on the item, which is a table, a view, a schema, or the database. You also specify the timing point, which determines whether the trigger fires before or after the triggering statement runs and whether it fires for each row that the triggering statement affects. By default, a trigger is created in the enabled state. For more information about the **CREATE TRIGGER** statement, see "CREATE TRIGGER Statement".

If the trigger is created on a table or view, then the triggering event is composed of DML statements, and the trigger is called a DML trigger.

If the trigger is created on a schema or the database, then the triggering event is composed of either DDL or database operation statements, and the trigger is called a system trigger.

A conditional trigger has a WHEN clause that specifies a SQL condition that the database evaluates for each row that the triggering statement affects.

When a trigger fires, tables that the trigger references might be undergoing changes made by SQL statements in other users' transactions. SQL statements running in triggers follow the same rules that standalone SQL statements do. Specifically:

- Queries in the trigger see the current read-consistent materialized view of referenced tables and any data changed in the same transaction.
- Updates in the trigger wait for existing data locks to be released before proceeding.

An INSTEAD OF trigger is either:

- A DML trigger created on either a nonconditioning view or a nested table column of a nonconditioning view

A system trigger defined on a CREATE statement

```

CREATE OR REPLACE TRIGGER t
BEFORE
INSERT OR
UPDATE OF salary, department_id OR
DELETE
ON employees
BEGIN
CASE
WHEN INSERTING THEN
    DBMS_OUTPUT.PUT_LINE('Inserting');
WHEN UPDATING('salary') THEN
    DBMS_OUTPUT.PUT_LINE('Updating salary');
WHEN UPDATING('department_id') THEN
    DBMS_OUTPUT.PUT_LINE('Updating department ID');
WHEN DELETING THEN
    DBMS_OUTPUT.PUT_LINE('Deleting');
END CASE;
END;

```

Figure 5.19 An Example of Trigger

5.7 User Roles

A user privilege is a right to execute a particular type of SQL statement, or a right to access another user's object. The types of privileges are defined by Oracle. Roles, on the other hand, are created by users (usually administrators) and are used to group together privileges or other roles. They are a means of facilitating the granting of multiple privileges or roles to users. A role groups several privileges and roles, so that they can be granted to and revoked from users simultaneously. A role must be enabled for a user before it can be used by the user.

Oracle provides some predefined roles to help in database administration. Some roles, listed in Table-1, are automatically defined for Oracle databases when you run the standard scripts that are part of database creation. You can grant privileges and roles to, and revoke privileges and roles from, these predefined roles in the same way as you do with any role you define[19].

Role Name	CONNECT
Description	Includes the following system privileges: ALTER SESSION, CREATE CLUSTER, CREATE DATABASE LINK, CREATE SEQUENCE, CREATE SESSION, CREATE SYNONYM, CREATE TABLE, CREATE VIEW
Role Name	RESOURCE
Description	Includes the following system privileges: CREATE CLUSTER, CREATE INDEXTYPE, CREATE OPERATOR, CREATE PROCEDURE, CREATE SEQUENCE, CREATE TABLE, CREATE TRIGGER, CREATE TYPE
Role Name	DBA
Description	All system privileges WITH ADMIN OPTION
Role Name	EXP_FULL_DATABASE
Description	Provides the privileges required to perform full and incremental database exports. Includes: SELECT ANY TABLE, BACKUP ANY TABLE, EXECUTE ANY PROCEDURE, EXECUTE ANY TYPE, ADMINISTER RESOURCE MANAGER, and INSERT, DELETE, and UPDATE on the tables SYS.INCVID, SYS.INCFIL, and SYS.INCEXP. Also the following roles: EXECUTE_CATALOG_ROLE and SELECT_CATALOG_ROLE.
Role Name	IMP_FULL_DATABASE
Description	Provides the privileges required to perform full database imports. Includes an extensive list of system privileges and the following roles: EXECUTE_CATALOG_ROLE and SELECT_CATALOG_ROLE.
Role Name	AQ_USER_ROLE
Description	Obsoleted, but kept mainly for release 8.0 compatibility. Provides execute privilege on DBMS_AQ and DBMS_AQIN.

You can create a role using the CREATE ROLE statement, but you must have the CREATE ROLE system privilege to do so. Typically, only security administrators have this system privilege.

You must give each role you create a unique name among existing usernames and role names of the database. Roles are not contained in the schema of any user. In a database that uses a multibyte character set, Oracle recommends that each role name contain at least one single-byte character. If a role name contains only multibyte characters, the encrypted role name/password combination is considerably less secure.

The IDENTIFIED BY clause specifies how the user must be authorized before the role can be enabled for use by a specific user to which it has been granted. If this clause is not specified, or NOT IDENTIFIED is specified, then no authorization is required when the role is enabled. Roles can be specified to be authorized by:

- The database using a password
- An application using a specified package
- Externally by the operating system, network, or other external source
- Globally by an enterprise directory service

5.9 Database Security, Management, Defragmentation

Database security entails allowing or disallowing user actions on the database and the objects within it. Oracle uses schemas and security domains to control access to data and to restrict the use of various database resources.

Oracle provides comprehensive discretionary access control. Discretionary access control regulates all user access to named objects through privileges. A privilege is permission to access a named object in a prescribed manner; for example, permission to query a table. Privileges are granted to users at the discretion of other users.

Each Oracle database has a list of user names. To access a database, a user must use a database application and attempt a connection with a valid user name of the database. Each user name has an associated password to prevent unauthorized use.

Oracle Database 12c provides multi-layered security spanning preventive, detective, and administrative controls. This includes transparent data encryption, data redaction, data masking, privileged user controls, privilege usage analysis, conditional auditing and real application security. Combined with Oracle Audit Vault and Database Firewall, Oracle Database 12c provides unprecedented controls to help organizations address existing and emerging security and compliance requirements[20].

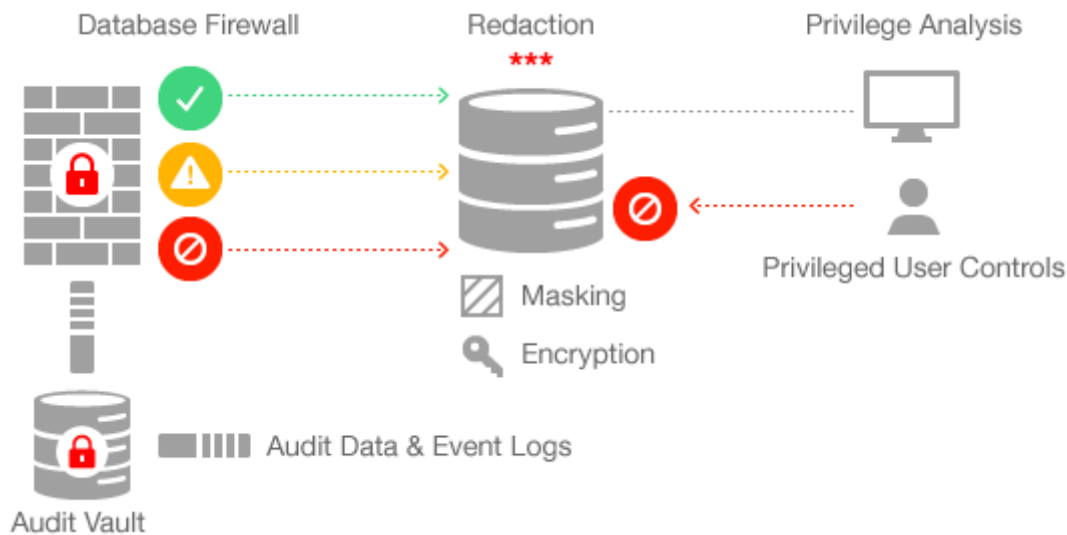


Figure 5.20 Database Security

Oracle revolutionized the field of enterprise database management systems with the release of Oracle Database 10g by introducing the industry's first self-management capabilities built right into the database kernel. Today, after several releases and continuous improvement of this intelligent management infrastructure, Oracle Database provides the most extensive self-management capabilities in the industry, ranging from zero-overhead instrumentation to integrated self-healing and business-driven management. Oracle's Database management capabilities make DBA lives easier by providing a full-lifecycle solution encompassing change and configuration management, patching, provisioning, testing, masking/subsetting, performance management and automatic tuning.

5.10 Performance Management

Diagnosing a slowly performing system is a time consuming task and often the activity where the DBAs spend most of their time. A number of third party tuning tools are available today but few of them are geared towards answering common questions such as, 'How can I make the biggest improvements in the system?' or 'Why is the system slower today than it was yesterday at the same time?' Oracle Database 12c includes a self-diagnostic engine built right into the Database kernel that completely liberates administrators from the complex and arduous task of diagnosing performance problems. Whether you are managing one or many databases, the database performance management features built into the Oracle

database offers a complete, cost effective, and easy to use solution for managing the performance your Oracle Database environment. When used as part of Oracle Enterprise Manager, Diagnostics Pack additionally provides enterprise-wide performance and availability reporting, a centralized performance repository, and valuable cross-system performance aggregation, significantly simplifying the task of managing large sets of databases.

Database management involves the monitoring, administration, and maintenance of the databases and database groups in your enterprise. Enterprise Manager is the premier tool for managing your database environment [21].

With Enterprise Manager, you receive:

- A complete set of integrated features for managing Oracle Databases
- Unparalleled scalability that lets you manage a single database or thousands of instances
- An intuitive management product that leads the industry in ease of deployment and use

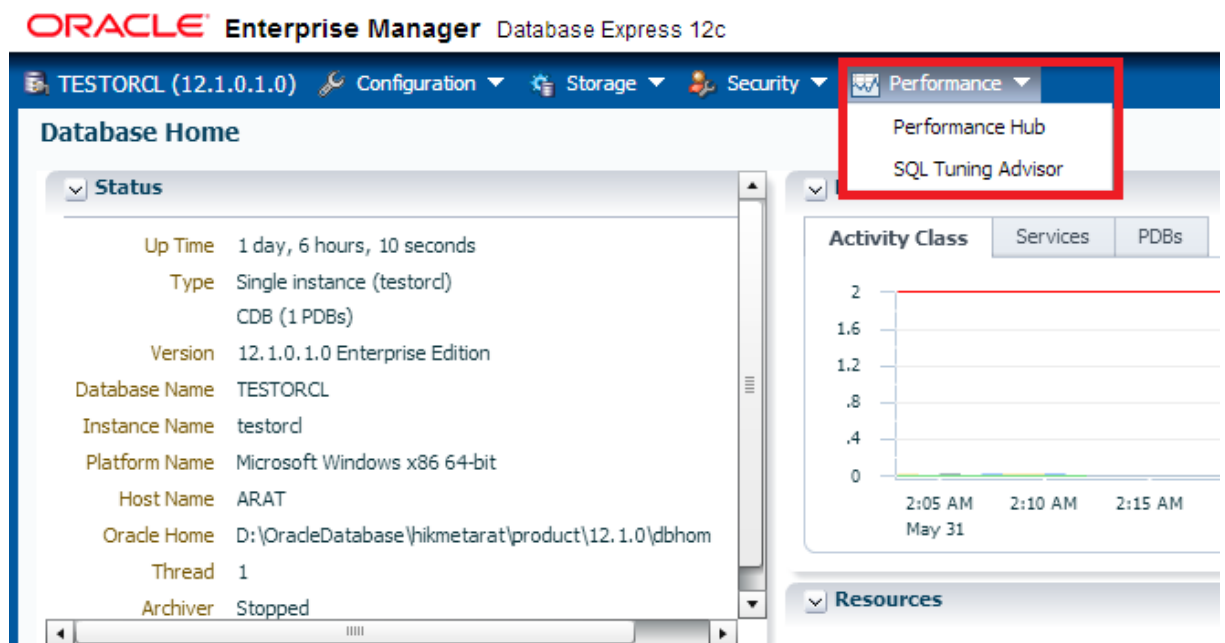


Figure 5.21 Performance Management

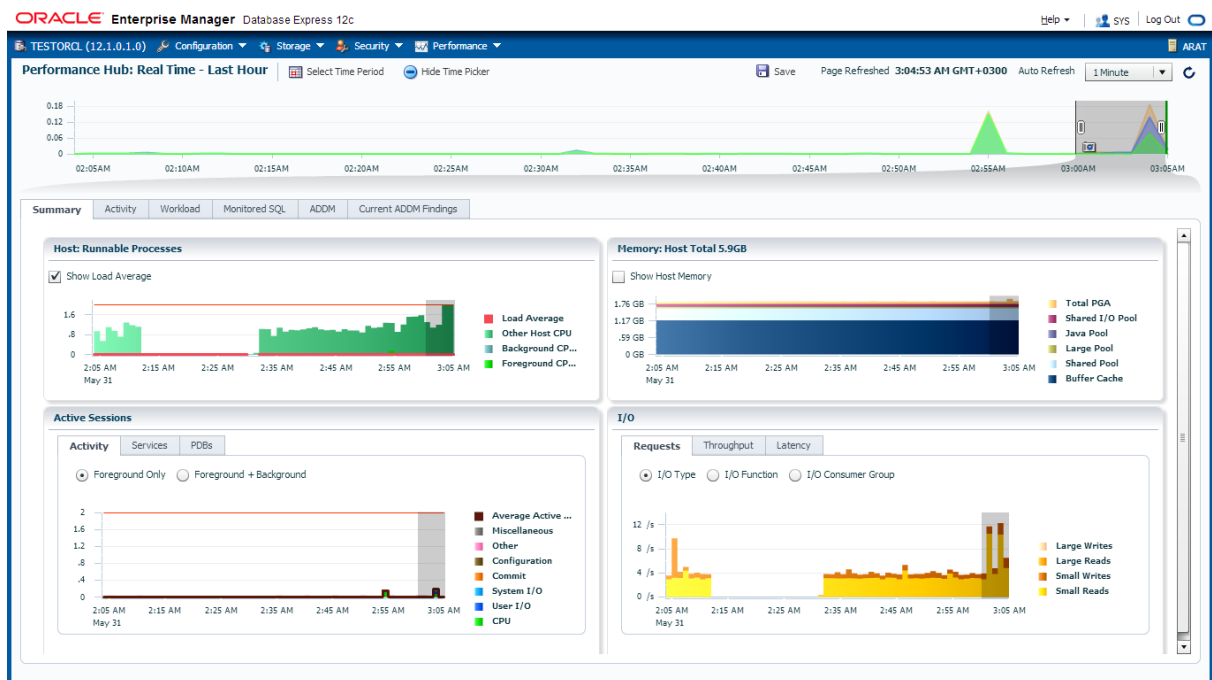


Figure 5.22 Performance Hub

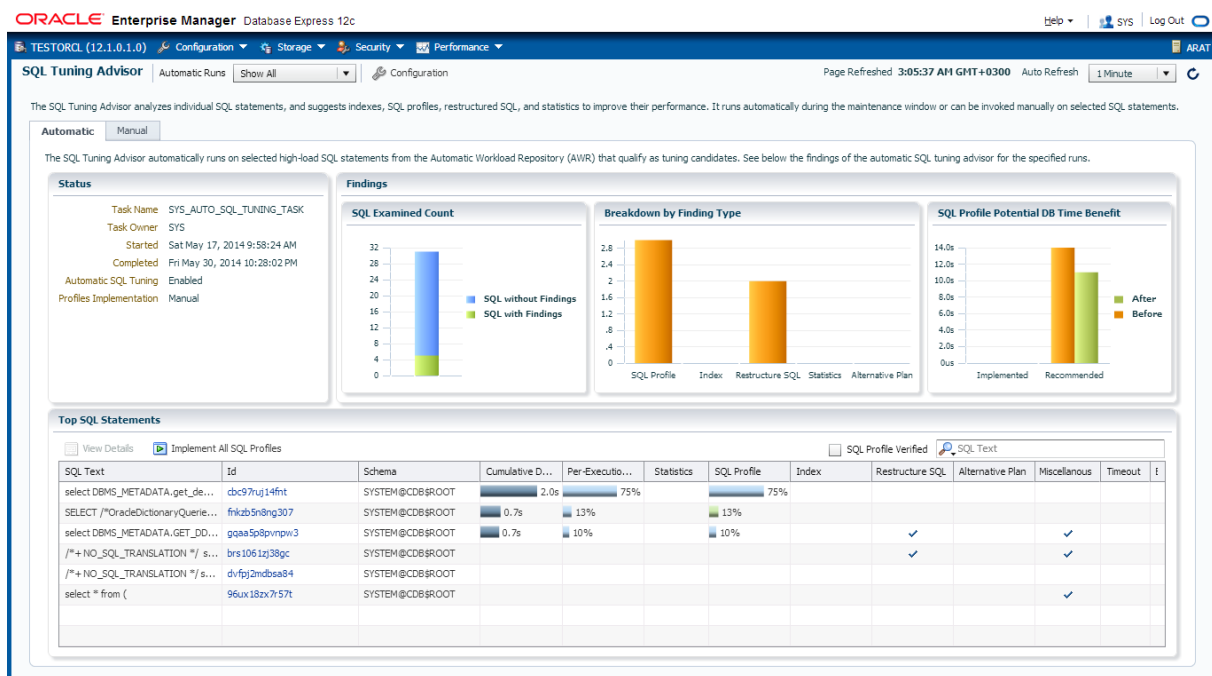


Figure 5.23 SQL Tuning Advisor

6. Online Oracle Education Website

6.1. Creating Website's Interface

User interface design (UID) or user interface engineering is the design of websites with the focus on the user's experience and interaction. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals—what is often called user-centered design. And that was our main focus while choosing website's interface[22].

Interface design requires considerable amount of knowledge of HTML and CSS and sometimes JavaScript.

HTML: **HTML or HyperText Markup Language** is the standard markup language used to create web pages[23].

HTML is written in the form of HTML elements consisting of tags enclosed in angle brackets (like <html>). HTML tags most commonly come in pairs like <h1> and </h1>, although some tags represent empty elements and so are unpaired, for example . The first tag in a pair is the start tag, and the second tag is the end tag (they are also called opening tags and closing tags).

The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page. HTML describes the structure of a website semantically along with cues for presentation, making it a markup language rather than a programming language.

HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as **JavaScript** which affect the behavior of HTML web pages. **JavaScript (JS)** is a dynamic computer programming language[24]. It is most commonly used as part of web browsers, whose implementations allow client-side scripts to interact with the user, control the browser, communicate asynchronously, and alter the document content that is

displayed. It is also being used in server-side programming, game development and the creation of desktop and mobile applications.

CSS: Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. While most often used to style web pages and interfaces written in HTML and XHTML, the language can be applied to any kind of XML document, including plain XML, SVG and XUL. CSS is a cornerstone specification of the web and almost all web pages use CSS style sheets to describe their presentation.

CSS is designed primarily to enable the separation of document content from document presentation, including elements such as the layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content.

The CSS specifications are maintained by the World Wide Web Consortium (W3C). Web designers can get all sorts of information about HTML, CSS and JavaScript from <http://www.w3schools.com/> [25].

An HTML editor is a computer program for creating web pages. Although the HTML markup of a web page can be written with any text editor, specialized HTML editors can offer convenience and added functionality. For example, many HTML editors work not only with HTML, but also with related technologies such as CSS, XML and JavaScript.

We used an editor that we can work not only with HTML but also can work with CSS and JavaScript which is Adobe Dreamweaver CS6. Adobe Dreamweaver is a proprietary web development tool developed by Adobe Systems. It is very user friendly in terms of ease of use, convenience and visuality [26].



Figure 6.1.1: Adobe Dreamweaver Icon

After creating user interface of the website, we started using Visual Studio Express 2012 for Web to develop ASP.NET website, because while DW is more convenient for visual design VS is better for ASP.NET and C#.

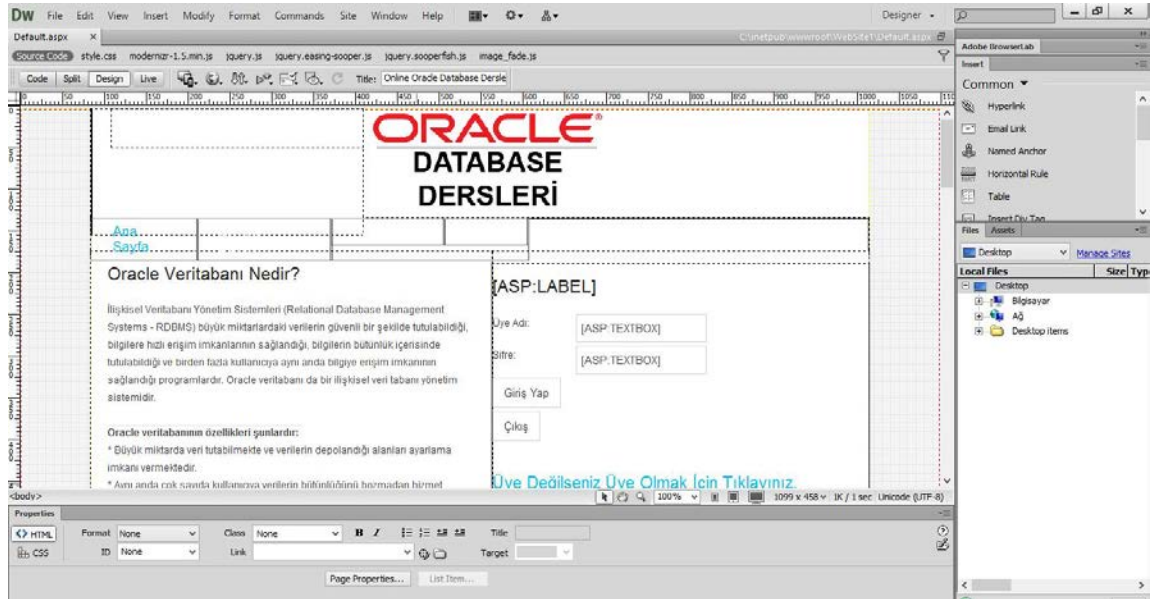


Figure 6.1.2: Designing User Interface in Adobe Dreamweaver

6.2. Recording Oracle Videos

I used Camtasia Recorder for creating Oracle Database education videos.

First I chose record applications to my computer's desktop. Camtasia Recorder captures cursor movements, menu selections, pop-up and layered windows, typing, and any other action seen on the screen[27].

In addition to screen recording, Camtasia recorder allows you to draw on the screen and add effects while recording. Complete the following to record:



Figure 6.2.1: Camtasia Recorder Interface

1. Select an area to record:
 - Record the full screen: Click the **Full Screen** button.
 - Record with custom dimensions: Click the **Custom** button. The custom options expand.

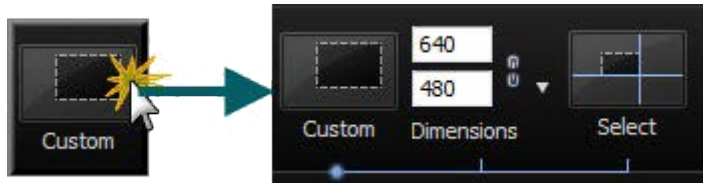


Figure 6.2.2: Selecting Screen Dimension

2. Select the recording settings
3. Select additional recording options in the *Tools Options* dialog box.
4. Click the **Record** button.
5. Record the screen. The toolbar changes when you begin recording.

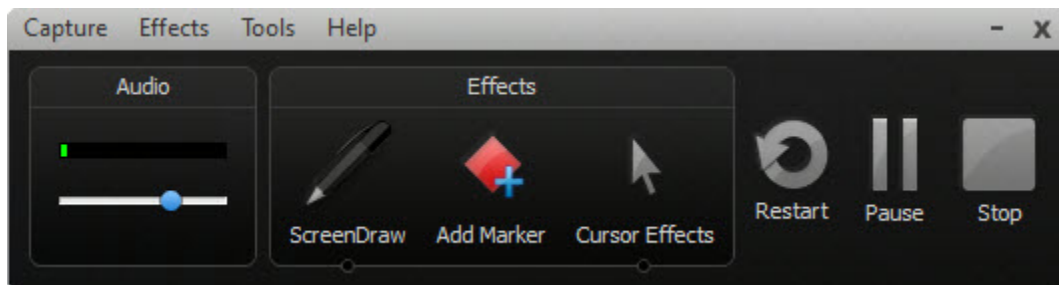


Figure 6.2.3: Pause/Stop Screen

6. Click the **Stop** button or press <F10>. The recording preview appears.

6.3. Integrating Videos and Website

Youtube allows users to embed Youtube Videos into their websites or apps. After recording Oracle DB educational videos and uploading them into Youtube, we open the video and click “Share” option right below the video[28].

After that we choose “Embed” option and copy the <iframe> HTML code and paste it into our website wherever we want the video to position.



Figure 6.3.1: Youtube Embed Option

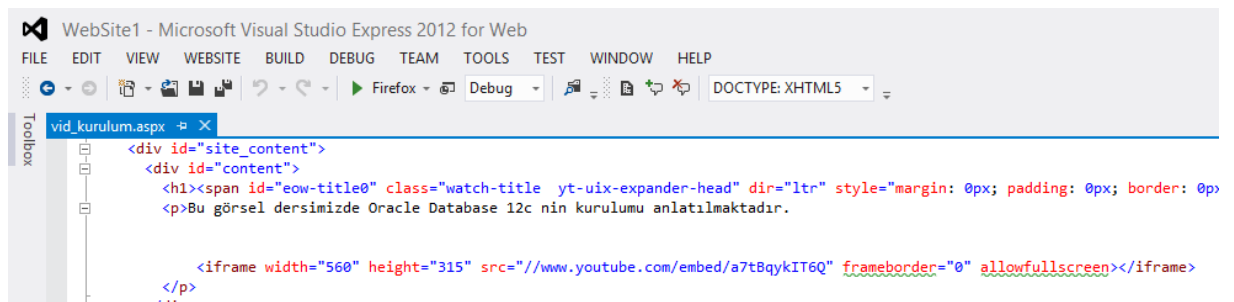


Figure 6.3.2: Embedding Youtube Video to the website – 1



Figure 6.3.3: Embedding Youtube Video to the website - 2

CONCLUSION

As a result of this project, we are now well-informed about development of Oracle Database and ASP.NET.

We sincerely believe that our work on this project will help us in our future jobs that we are going to have after we grauate.

We will put our work in this project proudly to our resumes. And we hope that whoever open this website will benefit from our project as we aimed when we started to this project.

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CURRICULUM VITAE I

PERSONAL INFORMATION

Name Surname: Şebnem GÖKÇE
Date of Birth: 05.11.1991
Place of Birth: Üsküdar/İstanbul
Nationality: Turkish Republic
Driver's Licence: Yes (B Class)
Marital Status: Single
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EDUCATION

Istanbul Aydın University, Engineering Faculty, Software Engineering (Engineering), 2011 - ..., GPA: 3.43 (Current GPA)

Marmara University, Vocational School of Technical Sciences, Computer Programming, Graduate, 2009 - 2011, GPA: 3.20

High School: Bahçelievler Erkan Avcı Anatolian High School, Computer, 2005 – 2009

WORK EXPERIENCES AND INTERNSHIPS:

Intern, Medical Park Hospital, Information Technologies (IT), August 2013 - September 2013

Intern, BEDAŞ (Boğaziçi Elektrik Dağıtım A.Ş.), Information Technologies (IT), July 2013 - August 2013

Intern, Medical Park Hospital, Information Technologies (IT), July 2010 - September 2010

Intern, Okmeydanı Education and Research Hospital, Information Technologies (IT), July 2008 - September 2008

LANGUAGE SKILLS

English: Proficient in Reading, Writing, Speaking - TOEFL Score: 86
English Preparatory School – İstanbul Aydın University (2011-2012)

CURRICULUM VITAE II

PERSONAL INFORMATION

Name Surname: Hikmet ARAT
Date of Birth: 10.07.1991
Place of Birth: İstanbul
Nationality: Turkish Republic
Driver's Licence: Yes (B Class)
Marital Status: Single
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EDUCATION

Istanbul Aydın University, Engineering Faculty, Software Engineering (Engineering), 2011 - ..., GPA: 3.17 (Current GPA)

Marmara University, Vocational School of Technical Sciences, Computer Programming, Graduate, 2009 - 2011, GPA: 2.80

High School: Bağcılar Abdurrahman and Nermin Bilimli Anatolian High School, Computer Programming, 2005 – 2009

WORK EXPERIENCES AND INTERNSHIPS:

Internship, Koroza Ambalaj, Learned Skills: Basic, Delphi, C++, Visual Basic, 01.06.2007 - 01.09.2007

Internship, Koroza Ambalaj, Learned Skills: HTML, PHP, Adobe Photoshop, 01.06.2008 - 01.09.2008

Periodic Job, Koroza Ambalaj, Information Technology Staff, Learned Skills: Access, SQL, SAP, 01.06.2009 - 01.09.2009

Internship, Koroza Ambalaj, Learned Skills: Network Hardware, Computer Hardware, TCP/IP, 01.06.2010 - 01.09.2010

Periodic Job, DeFacto, Customer Representative, Learned Skills: Interviewing Skills, Listening and Speaking Skills, Analytical Skills, 01.06.2012 - 09.07.2012

Part-Time Job, IKSAP Company, Web Designer, ABAP Consultant, Mobile App Developer, 14.07.2013 – Still Working

LANGUAGE SKILLS

English: Advanced in Reading, Writing, Speaking - TOEFL Score: 60
English Preparatory School – İstanbul Aydın University (2011-2012)

