**Subquery**

A subquery can be nested inside the WHERE or HAVING clause of an outer SELECT, INSERT, UPDATE, or DELETE statement, or inside another subquery. Up to 32 levels of nesting is possible, although the limit varies based on available memory and the complexity of other expressions in the query. Individual queries may not support nesting up to 32 levels. A subquery can appear anywhere an expression can be used, if it returns a single value.SELECT Ord.SalesOrderID, Ord.OrderDate,

(SELECT MAX(OrdDet.UnitPrice)

FROM Sales.SalesOrderDetail AS OrdDet

WHERE Ord.SalesOrderID = OrdDet.SalesOrderID) AS MaxUnitPrice

FROM Sales.SalesOrderHeader AS Ord;

**What is a form? Basic types of forms.**

**Form**

A form is a database object that you can use to create a user interface that allows users to enter and edit your data. Forms often contain controls that perform various tasks. Though you can create a database without using forms by simply editing your data in the table most users prefer to use forms for viewing, entering, and editing data contained in the tables. Forms also allow you to control how other users interact with the data in the database. For example, you can create a form that shows only certain fields and allows only certain operations to be performed. This helps to protect data and reduce possible errors in data entry. This article provides you with a roundup of resources ranging from the basics of Access forms to creating and customizing the forms.

**Types of forms**

**Detail form**: A blank Access form that displays information about one record at a time.

**Multiple Items form**: Also known as a continuous form, displays information from more than one record at a time. Looks like a datasheet but gives you more control over things like text formatting, adding graphics, buttons, and other controls

**Split form:** Simultaneously displays the data in the Form view and Datasheet view. Useful when you need to view large amounts of data but only need to change one record at a time.

**Navigation form:**A form that contains a Navigation Control. Navigation forms are particularly important for navigating your database if your plan includes publishing the database to the Web, because the Access Navigation Pane is not available in a browser

Use the **Create** tab and try the options in the **Forms** group to quickly create new forms. You can also select a table or query in the Navigation Pane, and quickly create a new form based on that object by using the Form command.

**Method for creating forms**

**Form** tool: To quickly create a single item form that displays information about one record at a time.

**Form Wizard**: Use this tool to create a form when you want to be more selective about which fields appear on the form. Also lets you define how the data is grouped and sorted.

**Blank form**:If the form tool or the wizard doesn't meet your needs, the **Blank form** tool offers a very quick way to build a form, especially if you plan to add only a few fields on your form

**Different views for forms**

 Access forms can be viewed in three different views, the Form view, Design view, and the Layout view. Knowing which view to use for a specific task can be useful. For example, you can use either the Design or Layout view to customize a form. The Form view is the default view for a form and is mostly used to view a form with the data or to enter data. Since the Layout and Design views are used for making design changes to a form, see the resources in the following table for more information on using these views:

|  |  |
| --- | --- |
| **Layout view** | Making most types of changes to a form. You can see the data as you modify the design, which is very useful when setting the size of controls or any other design changes that affects the appearance and usability of the form. |
| **Design view** | Making changes that require a more detailed view of the form’s structure such as, the Header, Detail, and Footer sections. You cannot see the underlying data when making design changes.in the Design view.  What’s good about using the Design view?   * Possibility to add a wider variety of controls such as, bound object frames, page breaks, and charts. * Edit text box control sources without using the property sheet. * Resize form sections. |

**Working with forms on a Web database**

A navigation form is simply a form that contains a Navigation Control. Navigation forms are a great addition to any database, but creating a navigation form is particularly important if you plan to publish a database to the Web, because the Access Navigation Pane does not display in a browser.

Forms:-detailed description link

<https://learnaccess.netlify.app/06-forms.html>

# **Exception Handling in PL/SQL**

An exception is an error which disrupts the normal flow of program instructions. PL/SQL provides us the exception block which raises the exception thus helping the programmer to find out the fault and resolve it.

There are two types of exceptions defined in PL/SQL

1. User defined exception.
2. System defined exceptions.

Syntax to write an exception

**WHEN** exception **THEN**

statement;

*DECLARE  
declarations section;*

*BEGIN  
executable command(s);*

*EXCEPTION  
WHEN exception1 THEN  
statement1;  
WHEN exception2 THEN  
statement2;  
[WHEN others THEN]  
/\* default exception handling code \*/*

*END;*

**When other** keyword should be used only at the end of the exception handling block as no exception handling part present later will get executed as the control will exit from the block after executing the WHEN OTHERS.

1. **System defined exceptions:**  
   These exceptions are predefined in PL/SQL which get raised WHEN certain **database rule is violated.**  
   System-defined exceptions are further divided into two categories:
   1. Named system exceptions.
   2. Unnamed system exceptions.
   3. **Named system exceptions:** They have a predefined name by the system like ACCESS\_INTO\_NULL, DUP\_VAL\_ON\_INDEX, LOGIN\_DENIED etc. the list is quite big.

So we will discuss some of the most commonly used exceptions:

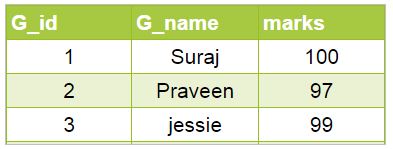
Lets create a table geeks.

create table geeks(g\_id int , g\_name varchar(20), marks int);

insert into geeks values(1, 'Suraj',100);

insert into geeks values(2, 'Praveen',97);

insert into geeks values(3, 'Jessie', 99);



1. **NO\_DATA\_FOUND**: It is raised WHEN a SELECT INTO statement returns *no* rows. For eg:

|  |
| --- |
| DECLARE     temp varchar(20);    BEGIN     SELECT g\_id into temp from geeks where g\_name='GeeksforGeeks';    exception     WHEN no\_data\_found THEN        dbms\_output.put\_line('ERROR');        dbms\_output.put\_line('there is no name as');        dbms\_output.put\_line('GeeksforGeeks in geeks table');  end; |

Output:

ERROR

there is no name as GeeksforGeeks in geeks table

**TOO\_MANY\_ROWS**:It is raised WHEN a SELECT INTO statement returns *more* than one row.

|  |
| --- |
| DECLARE     temp varchar(20);    BEGIN    -- raises an exception as SELECT  -- into trying to return too many rows     SELECT g\_name into temp from geeks;     dbms\_output.put\_line(temp);    EXCEPTION     WHEN too\_many\_rows THEN        dbms\_output.put\_line('error trying to SELECT too many rows');    end; |

Output:

error trying to SELECT too many rows

* + 1. **VALUE\_ERROR**:This error is raised WHEN a statement is executed that resulted in an arithmetic, numeric, string, conversion, or constraint error. This error mainly results from programmer error or invalid data input.

|  |
| --- |
| DECLARE     temp number;    BEGIN     SELECT g\_name  into temp from geeks where g\_name='Suraj';     dbms\_output.put\_line('the g\_name is '||temp);    EXCEPTION     WHEN value\_error THEN     dbms\_output.put\_line('Error');     dbms\_output.put\_line('Change data type of temp to varchar(20)');    END; |

Output:

Error

Change data type of temp to varchar(20)

**ZERO\_DIVIDE** = raises exception WHEN dividing with zero.

|  |
| --- |
| DECLARE     a int:=10;     b int:=0;     answer int;    BEGIN     answer:=a/b;     dbms\_output.put\_line('the result after division is'||answer);    exception     WHEN zero\_divide THEN        dbms\_output.put\_line('dividing by zero please check the values again');        dbms\_output.put\_line('the value of a is '||a);        dbms\_output.put\_line('the value of b is '||b);  END; |

Output:

dividing by zero please check the values again

the value of a is 10

the value of b is 0

**Unnamed system exceptions:**Oracle doesn’t provide name for some system exceptions called unnamed system exceptions.These exceptions *don’t* occur frequently.These exceptions have two parts *code and an associated message*.  
The way to handle to these exceptions is to *assign name* to them using **Pragma EXCEPTION\_INIT**  
Syntax:

PRAGMA EXCEPTION\_INIT(exception\_name, -error\_number);

error\_number are pre-defined and have negative integer range from -20000 to -20999.

**Example:**

|  |
| --- |
| DECLARE     exp exception;     pragma exception\_init (exp, -20015);     n int:=10;    BEGIN     FOR i IN 1..n LOOP        dbms\_output.put\_line(i\*i);           IF i\*i=36 THEN              RAISE exp;           END IF;     END LOOP;    EXCEPTION     WHEN exp THEN        dbms\_output.put\_line('Welcome to GeeksforGeeks');    END; |

Output:

1

4

9

16

25

36

Welcome to GeeksforGeeks

**User defined exceptions:**  
This type of users can create their own exceptions according to the need and to raise these exceptions explicitly ***raise*** command is used.

*Example:*

Divide non-negative integer x by y such that the result is greater than or equal to 1.

From the given question we can conclude that there exist two exceptions

Division be zero.

If result is greater than or equal to 1 means y is less than or equal to x.

|  |
| --- |
| DECLARE     x int:=&x; /\*taking value at run time\*/     y int:=&y;     div\_r float;     exp1 EXCEPTION;     exp2 EXCEPTION;    BEGIN     IF y=0 then         raise exp1;       ELSEIF y > x then        raise exp2;       ELSE        div\_r:= x / y;        dbms\_output.put\_line('the result is '||div\_r);       END IF;    EXCEPTION     WHEN exp1 THEN        dbms\_output.put\_line('Error');        dbms\_output.put\_line('division by zero not allowed');       WHEN exp2 THEN        dbms\_output.put\_line('Error');        dbms\_output.put\_line('y is greater than x please check the input');    END; |

*Input 1:* x = 20

y = 10

*Output:* the result is 2

*Input 2:* x = 20

y = 0

*Output:*

Error

division by zero not allowed

*Input 3:* x=20

y = 30

*Output:<.em>*

*Error*

*y is greater than x please check the input*

***RAISE\_APPLICATION\_ERROR****:*It is used to display user-defined error messages with error number whose range is in between -20000 and -20999. When RAISE\_APPLICATION\_ERROR executes it returns error message and error code which looks **same as Oracle built-in error*.***

***Example:***

|  |
| --- |
| DECLARE      myex EXCEPTION;      n NUMBER :=10;    BEGIN      FOR i IN 1..n LOOP      dbms\_output.put\_line(i\*i);          IF i\*i=36 THEN          RAISE myex;          END IF;      END LOOP;    EXCEPTION      WHEN myex THEN          RAISE\_APPLICATION\_ERROR(-20015, 'Welcome to GeeksForGeeks');    END; |

*Output:*

Error report:

ORA-20015: Welcome to GeeksForGeeks

ORA-06512: at line 13

1

4

9

16

25

36

**Graphical object**

**Graphical object** is an image in the symbol window; it can be selected, moved, modified or deleted.

Graphical objects include, for example, horizontal and vertical lines, linear regression channel, Fibonacci levels, rectangle, text mark, etc. Such images as indicator lines, indicator levels, candlesticks, comments written by the Comment() function and others cannot be selected and deleted, that is why they do not belong to graphical objects.

Graphical object are drawn by the client terminal in a security window in accordance with preset coordinates. Each graphical object depending on its type has one, two or three coordinates and other adjustable parameters. Any graphical object can be placed in a chart window manually (from the toolbar of a system menu), and also as a result of the execution of an application program started in the same window, including an Expert Advisor, script or custom indicator. Type and location of a graphical object can be modified manually or by a program sending new values of coordinates and other parameters to a graphical object.

Reports

### **What can you do with a report?**

A report is a database object that comes in handy when you want to present the information in your database for any of the following uses:

* Display or distribute a summary of data.
* Archive snapshots of the data.
* Provide details about individual records.
* Create labels.

### **Parts of a report**

While it is possible to create “unbound” reports that do not display data, but for the purposes of this article, we’ll assume that a report is bound to a data source such as a table or query. The design of a report is divided into sections that you can view in the Design view. Understanding how each section works can helps you create better reports. For example, the section in which you choose to place a calculated control determines how Access calculates the results. The following list is a summary of the section types and their uses:

| **Section** | **How the section is displayed when printed** | **Where the section can be used** |
| --- | --- | --- |
| Report Header | At the beginning of the report. | Use the report header for information that might normally appear on a cover page, such as a logo, a title, or a date. When you place a calculated control that uses the Sum aggregate function in the report header, the sum calculated is for the entire report. The report header is printed before the page header. |
| Page Header | At the top of every page. | Use a page header to repeat the report title on every page. |
| Group Header | At the beginning of each new group of records. | Use the group header to print the group name. For example, in a report that is grouped by product, use the group header to print the product name. When you place a calculated control that uses the Sum aggregate function in the group header, the sum is for the current group. You can have multiple group header sections on a report, depending on how many grouping levels you have added. For more information about creating group headers and footers, see the section Add grouping, sorting, or totals. |
| Detail | Appears once for every row in the record source. | This is where you place the controls that make up the main body of the report. |
| Group Footer | At the end of each group of records. | Use a group footer to print summary information for a group. You can have multiple group footer sections on a report, depending on how many grouping levels you have added. |
| Page Footer | At the end of every page. | Use a page footer to print page numbers or per-page information. |
| Report Footer | At the end of the report.  **Note:**In Design view, the report footer appears below the page footer. However, in all other views (Layout view, for example, or when the report is printed or previewed), the report footer appears *above* the page footer, just after the last group footer or detail line on the final page. | Use the report footer to print report totals or other summary information for the entire report. |

You’ll find that it’s much easier to create meaningful reports when your database has a well-designed table structure and relationships.

**Create a report in Access**

You can create reports for you Access desktop database by following the steps below:

### **Step 1: Choose a record source**

The record source of a report can be a table, a named query, or an embedded query. The record source must contain all of the rows and columns of data you want display on the report.

* If the data is from an existing table or query, select the table or query in the Navigation Pane, and then continue to [Step 2](https://support.microsoft.com/en-us/office/introduction-to-reports-in-access-e0869f59-7536-4d19-8e05-7158dcd3681c#__step_2__choose).
* If the record source does not yet exist, do one of the following:
  + Continue to [Step 2](https://support.microsoft.com/en-us/office/introduction-to-reports-in-access-e0869f59-7536-4d19-8e05-7158dcd3681c#__step_2__choose) and use the **Blank Report** tool,

Or

* + Create the table(s) or query that contains the required data. Select the query or table in the Navigation Pane, and then continue to [Step 2.](https://support.microsoft.com/en-us/office/introduction-to-reports-in-access-e0869f59-7536-4d19-8e05-7158dcd3681c#__step_2__choose)

**Step 2: Choose a report tool**

The report tools are located on the **Create** tab of the ribbon, in the **Reports** group. The following table describes the options:

| Tool | Description |
| --- | --- |
| Report | Creates a simple, tabular report containing all of the fields in the record source you selected in the Navigation Pane. |
| Report Design | Opens a blank report in Design view, to which you can add the required fields and controls. |
| Blank Report | Opens a blank report in Layout view, and displays the Field List from where you can add fields to the report |
| Report Wizard | Displays a multiple-step wizard that lets you specify fields, grouping/sorting levels, and layout options. |
| Labels | Displays a wizard that lets you select standard or custom label sizes, as well as which fields you want to display, and how you want them sorted. |

**Step 3: Create the report**

1. Click the button for the tool you want to use. If a wizard appears, follow the steps in the wizard and click **Finish** on the last page.  
   Access displays the report in Layout view.
2. Format the report to achieve the looks that you want:
   * Resize fields and labels by selecting them and then dragging the edges until they are the size you want.
   * Move a field by selecting it (and its label, if present), and then dragging it to the new location.
   * Right-click a field and use the commands on the shortcut menu to merge or split cells, delete or select fields, and perform other formatting tasks.

In addition, you can use the features described in the following sections to make your report more attractive and readable.

## Add grouping, sorting, or totals

The fastest way to add grouping, sorting, or totals to a desktop database report is to right-click the field to which you want to apply the group, sort, or total, and then click the desired command on the shortcut menu.

You can also add grouping, sorting, or totals by using the Group, Sort, and Total pane while the report is open in Layout view or Design view:

1. If the Group, Sort, and Total pane is not already open, on the **Report Design** tab, in the **Grouping and Totals** group, click **Group & Sort**.
2. Click **Add a group** or **Add a sort**, and then select the field on which you want to group or sort.
3. Click **More** on a grouping or sorting line to set more options and to add totals.

Highlight data with conditional formatting

Access includes tools for highlighting data on a report. You can add conditional formatting rules for each control or group of controls, and in client reports, you can also add data bars to compare data.

To add conditional formatting to controls:

1. Right-click the report in the Navigation Pane and click **Layout View**.
2. Select the required controls and on the **Format** tab, in the **Control Formatting** group, click **Conditional Formatting**.

**Tip:**To select multiple controls, hold down the CTRL key and click the controls.

1. In the **Conditional Formatting Rules Manager** dialog box, click **New Rule**.
2. In the **New Formatting Rule** dialog box, select a value under **Select a rule type**:
   * To create a rule that is evaluated for each record individually, select **Check values in the current record or use an expression**.
   * To create a rule that compares records to each other by using data bars, click **Compare to other records**.
3. Under **Edit the rule description**, specify the rule for when the formatting would be applied as well as what formatting should be applied, and then click **OK**.
4. To create an additional rule for the same control or set of controls, repeat this procedure from step 4.

Customizing color and fonts

Try an **App Theme** options to customize the color and fonts.

1. Open a report in Layout view by right-clicking it in the Navigation Pane and then clicking **Layout View**.
2. On the **Report Layout Design** tab, click **Themes** and point the cursor over the various themes in the gallery to preview the effects. Click on a theme to select it, and then save your report.
3. Use the **Colors** or **Fonts** galleries to set colors or fonts independently.

Add a logo or background image

You can add a logo or background image to a report and If you update the image, the update is automatically made wherever the image is used in the database.

To add or remove an image:

1. In the Navigation Pane, right-click the report and click **Layout View**.
2. In the report, click the position where you want to add the image and on the **Report Layout Design** tab, in the **Header/Footer** group, click **Logo**.
3. Navigate to the image, and click **Open**. Access adds the image to the report.
4. To remove the image, right-click the image and click Delete from the shortcut menu.

To add a background image:

1. In the Navigation Pane, right-click the report and click **Layout View**.
2. On the **Format** tab, in the **Background** group, click **Background Image**.
3. Select an image from the **Image Gallery** list or click **Browse**, select an image, and then click **OK**.

## Preview and print a report

### **Preview a report**

1. Right-click the report in the Navigation Pane and click **Print Preview**. You can use the commands on the **Print Preview** tab to do any of the following:
   * Print the report
   * Adjust page size or layout
   * Zoom in or out, or view multiple pages at a time
   * Refresh the data on the report
   * Export the report to another file format.
2. Click **Close Print Preview.**

### **Print a report**

To print a report without previewing it:

* Right-click the report in the Navigation Pane and click **Print**. The report is sent to your default printer.

**Note:**If you select the report in the Navigation Pane and select **Print** from the **File** tab, you can select additional printing options such as number of pages and copies and specify a printer.

* + To open a dialog box where you can select a printer, specify the number of copies, and so on, click **Print**.