

Oracle® Candidate Certification Guide:
Oracle Certified Application Developer
Track for Developer/2000™ Release 2

April 1999

Guide Contents

This Candidate Certification Guide provides you with detailed information about the Oracle Certified Professional (OCP) Program's Application Developer Track for Developer/2000™ Release 2. It includes the following items:

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For step-by-step instructions on how to schedule your certification test and for an overview of the program, see the *Oracle Candidate Certification Guide: An Overview*, available from Sylvan Prometric or via the Web: <http://education.oracle.com/certification>. Or, please call: In the United States, Canada, Mexico: +1.888.31-ORACLE, Ext. 13 (+1.888.316.7225, Ext. 13). In all other countries: +1.805.775.4451, Ext. 13.

Oracle® Certified Application Developer Track for Developer/2000™ Release 2

Oracle® Certified Application Developer Track Overview

Whether you're new to Oracle or upgrading from Developer/2000 Rel. 1, the Oracle Certified Professional (OCP) Program can help you reinforce your knowledge of leading-edge technology with a tangible industry-recognized credential.

Release 2 of Developer/2000—Oracle's premier development toolset—gives application developers access to significant advances in scalability and compatibility, as well as the ability to effectively leverage the strengths of both client/server technology and the Web. Your knowledge of this leading-edge technology can make you a hot commodity in a fast-paced IT marketplace.

The Oracle Certified Professional (OCP) Program was developed by Oracle to guide technical professionals in achieving the depth of knowledge and hands-on skills required to maximize core products according to our own rigorous standard.

Two Paths to Release 2 Certification

The Oracle Certified Application Developer Track for Developer/2000 Rel. 2 offers two options: a Core Path for application developers starting their certification with Developer/2000 Rel. 2 and an Upgrade Path for those who are already certified or who plan to complete certification for Developer/2000 Rel. 1.

The Core Path

Application developers who are starting their certification with Rel. 2 must pass five separate, scenario-based tests.

Test 1 *Introduction to Oracle: SQL and PL/SQL™*

Test 2 *Develop PL/SQL Program Units*

Test 3 *Developer/2000: Build Forms I*

Test 4 *Developer/2000: Build Forms II*

Test 5 *Developer/2000: Build Reports*

The Upgrade Path

Do you have, or are you planning to complete your Developer/2000 Rel. 1 certification? You can leverage your hard-earned knowledge and experience. To upgrade your certification, you will only need to take one test on the new features of Rel. 2, *Developer/2000 Rel. 2 New Features*.

Apply Your Knowledge

The tests required for each of these paths will challenge you to apply specific knowledge you've gained through Oracle training, as well as experience you've developed on the job, to real-world scenarios. Working on a computer with no other resources, you'll answer a series of multiple-choice questions. Only proven performers will be able to pass the tests.

The certification tests in the Oracle Certified Application Developer Track for Developer/2000 Rel. 2 are created against Developer/2000 Rel. 2, Oracle 7.3, PL/SQL V 2.3, and SQL*Plus V 3.3.

Oracle Certification Test Preparation

The typical candidate to take the Oracle Certified Application Developer tests is an application developer who has completed up-to-date training on Developer/2000 Rel. 2 and has at least six months of on-the-job experience.

While you are not required to take any Oracle Education courses before completing the certification tests, you are likely to find this training very useful. Instructor-Led Training (ILT) courses and Computer-Based Training (CBT), included in the Oracle Education comprehensive job role-related curriculum, are excellent resources as you prepare to become an Oracle Certified Application Developer. Assessment tests, available on the OCP program Web site at <http://education.oracle.com/certification>, can help you target and fill specific gaps in your knowledge.

Contact your local Oracle representative for more information about selecting specific Oracle Education courses and products to prepare for your tests.

Visit the OCP Web site at:
<http://education.oracle.com/certification>

**Oracle Certified Application
Developer for Developer/2000
Release 2**

Preparation Opportunities

Oracle recommends combining Oracle Education offerings with practice and on-the-job experience for the best test preparation. Candidates should review the Test Content (starting on page 3) to ensure they have prepared for all topics covered in the OCP tests.

ILT	CBT²
Introduction to Oracle: SQL and PL/SQL	
Introduction to Oracle: SQL and PL/SQL ¹ (5 days)	Oracle SQL and SQL*Plus: Basic SELECT Statements Oracle SQL and SQL*Plus: DML and DDL PL/SQL: Basics Oracle SQL and SQL*Plus: Advanced SELECT Statements Oracle SQL and SQL*Plus: SQL*Plus and Reporting
Develop PL/SQL Program Units	
Develop PL/SQL Program Units (3 days)	Oracle PL/SQL: Procedures, Functions and Packages Oracle PL/SQL: Database Programming
Developer/2000 Build Forms I and Build Forms II	
Developer/2000: Build Forms I (5 days)	Form Builder: Forms Fundamentals Form Builder: Enhancing the User Interface Form Builder: Writing and Debugging Code
Developer/2000: Build Forms II (3 days)	Form Builder: Managing Module Types Form Builder: Handling Multiple Object Relationships Form Builder: Including Reusable Oracle Components
Developer/2000 Build Reports	
Developer/2000: Build Reports (4 days)	Report Builder: Report Fundamentals Report Builder: Enhancing Reports Report Builder: Controlling Reports
Developer/2000 Rel. 2 New Features	
Developer/2000 Rel. 2 New Features (3 days)	

Note: If your country does not offer the exact course titles listed above, please contact your local Oracle Education representative.

¹ This title may be comprised of two or more courses in your location.

²The following titles should be taken together.

ILT Instructor-Led Training
CBT Computer-Based Training

Test 1 Introduction to Oracle: SQL and PL/SQL ILT¹
—Test Content

Selecting Rows

- Write a SELECT statement to query the database
- Perform arithmetic calculations
- Handle null values
- Specify alternative column headings using aliases
- Concatenate columns
- Edit SQL commands in the SQL*Plus(R) buffer

Limiting Selected Rows

- Sort row output using the ORDER BY clause
- Enter search criteria using the WHERE clause

Single Row Functions

- Explain the various types of functions available in SQL
- Identify the basic concepts of using functions
- Include a variety of character, number, and data functions in SELECT statements
- Explain the conversion functions and how they might be used

Displaying Data from Multiple Tables

- Write SELECT statements to access data from more than one table using equality and non-equality joins
- View data that would not normally meet a join condition by using outer joins
- Join a table to itself

Group Functions

- Identify the available group functions
- Explain the use of group functions
- Group data using the GROUP BY clause
- Include or exclude grouped rows by using the HAVING clause

Subqueries

- Write nested subqueries to query data based on unknown criteria
- Use subqueries in data manipulation statements
- Order data with subqueries

Specifying Variables at Runtime

- Create a SELECT statement that prompts the user to input a value at runtime
- Define a variable that can be automatically picked up by the SELECT statement at runtime
- Define a variable by using the SQL*Plus ACCEPT command

Overview of Data Modeling and Database Design

- List and define basic types of data relationships
- Read an entity relationship diagram

¹This title may be comprised of two or more courses in your location.

Test 1—content continued**Creating Tables**

- Create a table containing integrity constraints
- Identify table naming conventions
- Describe the datatypes that can be used when specifying column definitions
- Recognize the indexes that are created automatically by constraints
- Create a table by populating it with rows from another table

Oracle Data Dictionary

- Describe the data dictionary views a user may access
- Query data from the data dictionary

Manipulating Data

- Insert new rows into a table
- Update existing rows in a table
- Delete rows from a table
- Explain transaction controls and their importance

Altering Tables and Constraints

- Add and modify columns
- Add, enable, disable, or remove constraints
- Drop a table
- Remove all rows leaving the table definition intact
- Change object names
- Add comments to objects and view comments from the data dictionary

Creating Sequences

- Explain the use of sequences
- Create a sequence
- Use a sequence
- Modify a sequence definition
- Remove a sequence

Creating Views

- Explain the concept of a view
- Use data dictionary views
- Create simple and complex views
- Create a view with an option to enforce constraints
- Modify a view
- Remove a view

Creating Indexes

- Distinguish between the indexes that are created automatically and those that are created manually
- Identify the uses for indexes
- Explain the index structure and why it improves query speed
- Create a non-unique index
- Remove an index from the data dictionary
- Evaluate guidelines for creating and using indexes

Test 1—content continued**Controlling User Access**

- Explain the concept of the database security model
- Describe system privileges
- Set up and maintain database access by using roles
- Identify object privileges
- Change a password
- Grant and revoke object privileges
- Create synonyms for ease of table access

Overview of PL/SQL

- Determine the benefits of accessing the Oracle database with Procedural Language/SQL (PL/SQL)
- Describe basic PL/SQL program constructs

Developing a Simple PL/SQL Block

- Declare and use variables and constants in PL/SQL
- Assign new values to variables within the executable section

Interacting with Oracle

- Use SELECT, INSERT, UPDATE, and DELETE commands in PL/SQL subprograms
- Determine the outcome of SQL statements by using implicit cursor attributes
- Control transactions within PL/SQL

Controlling Flow in PL/SQL Blocks

- Conditionally control processing in a PL/SQL block
- Iterate statements by using various types of loops

Processing Queries by Using Explicit Cursors

- Explain the differences between implicit and explicit cursors
- Use cursors to fetch rows from the database
- Create an explicit cursor with parameters
- Write cursor FOR loops

Error Handling

- Identify common exceptions
- Describe the three basic types of exceptions
- Write exception-handling routines

**Test 2 Develop PL/SQL
Program Units**
—Test Content

Developing Stored Procedures and Functions

- Create procedures using SQL*Plus and Oracle Procedure Builder™
- Invoke procedures
- Create functions using SQL*Plus and Oracle Procedure Builder
- Invoke functions
- Handle exceptions: Oracle exceptions, user-defined exceptions and
`RAISE_APPLICATION_ERROR`

Managing Procedures and Functions

- Select information about stored procedures and functions from the database dictionary
- Debug procedures using the `DBMS_OUT` package
- Debug procedures using the Oracle Procedure Builder
- Appreciate the security control for the owner and user

Managing Procedural Dependencies

- Track procedural dependencies
- Predict the effect of changing a database object upon stored procedures and functions
- Manage procedural dependencies within a single database
- Manage procedural dependencies with a distributed system

Developing and Using Packages

- Create a package to group together related variables, cursors, constants, exceptions, procedures, and functions

- Make a package construct either public or private
- Invoke a package construct
- Manage packages by documenting the text and compile errors, produce SQL*Plus scripts to facilitate development, and control security
- Manage procedural dependencies that involve packages
- Take advantage of packages supplied by the Oracle Server™
- Take advantage of packages supplied by the Oracle Procedure Builder

Developing Database Triggers

- Distinguish database triggers, stored procedures and Oracle Forms triggers
- Create a statement trigger to be executed whenever a particular data manipulation statement is issued on a specific table
- Create a row trigger to be executed whenever a row in a table is affected by a data manipulation statement
- Manage triggers by documenting the source code, controlling security, and disabling them
- Adhere to command restrictions within triggers by understanding their exact firing mechanism
- Produce triggers to complement the capabilities of the Oracle base product

**Test 3 Developer/2000:
Build Forms I**
—Test Content

Running a Form Builder Application

- Describe the runtime environment
- Navigate a Form Builder application
- Describe the two modes of operation
- Retrieve both restricted and unrestricted data from the database into a Form Builder application
- Insert, update, and delete records
- Display database errors using help facility

Working in the Form Builder Environment

- Identify the main Form Builder executables
- Identify the main components of Form Builder
- Identify the main objects in a form module

Creating a Basic Form Module

- Create a form module
- Create a data block using the data block wizard
- Modify a data block using the data block wizard
- Create a layout using the layout wizard
- Modify a layout using the layout wizard
- Save, compile, and run a form module
- Identify file formats and their characteristics
- Create data blocks with relationships
- Run a master-detail form module

Working with Data Blocks and Frames

- Identify the components of the property palette
- Manipulate properties through the property palette
- Control the behavior and appearance of data blocks
- Control frame properties
- Create blocks that do not directly correspond to the database
- Delete data blocks and their components

Working with Text Items

- Describe text items
- Create a text item
- Modify the appearance of a text item
- Control the data in a text item
- Modify the navigational behavior of a text item
- Enhance the relationship between the text item and the database
- Modify the functionality of a text item
- Include help messages in the application

Creating LOVs and Editors

- Describe LOVs and editors
- Design, create, and associate LOVs with text items in a form module
- Create editors and associate them with text items in a form module

Test 3—content continued**Creating Additional Input Items**

- Identify the item types that allow input
- Create a check box
- Create a list item
- Create a radio group

Creating Non-Input Items

- Identify item types that do not allow input
- Create a display item
- Create an image item
- Create a sound item
- Create a button
- Create a calculated field

Creating Windows and Content Canvases

- Describe windows and content canvases
- Describe the relationship between windows and content canvases
- Identify window and content canvases properties
- Display a form module in multiple windows
- Display a form module on multiple layouts

Working with Other Canvases

- Describe the different types of canvases and their relationships to each other
- Identify the appropriate canvas type for different scenarios
- Create an overlay effect using the stacked canvases
- Create a toolbar
- Create a tabbed interface

Introduction to Triggers

- Define triggers
- Identify the different trigger categories
- Plan the type and scope of triggers in a form
- Describe the properties that affect the behavior of a trigger

Producing Triggers

- Write trigger code
- Explain the use of built-in subprograms in Developer/2000 applications
- Describe the When-Button-Pressed trigger
- Describe the When-Window-Closed trigger

Debugging Triggers

- Describe the components of the Debugger
- Run a form module in debug mode
- Debug PL/SQL code

Adding Functionality to Items

- Supplement the functionality of input items by using triggers and built-ins
- Supplement the functionality of non-input items by using triggers and built-ins

Test 3—content continued**Runform Messages and Alerts**

- Describe the default messaging
- Handle errors using built-in subprograms
- Identify the different types of Form Builder messages
- Control system messages
- Create and control Alerts

Query Triggers

- Explain the process involved in querying a data block
- Describe query triggers and their scope
- Write triggers that screen query conditions
- Write triggers to supplement query results
- Control trigger action based on the form query status

Validation

- Explain the effects of the validation unit upon a form
- List Form Builder validation properties
- Control validation using triggers

Navigation

- Distinguish between internal and external navigation
- Describe and use the navigation triggers
- Identify built-ins that cause navigation

Transaction Processing

- Describe the details of commit processing and commit triggers
- Supplement transaction processing using triggers
- Allocate sequence numbers to records as they are applied to tables
- Implement Array DML

Writing Flexible Code

- Describe flexible code
- State the advantages of using system variables
- Identify built-in subprograms that assist flexible coding
- Write code to reference objects by internal ID
- Write code to reference objects indirectly

Sharing Objects and Code

- Describe the various methods for reusing objects and code
- Inherit properties from property classes
- Group related objects for reuse
- Explain the inheritance symbols in the Property palette
- Reuse objects from an object library
- Reuse PL/SQL code

Introducing Multiple Form Applications

- Call one form from another form module
- Define multiple form functionality

**Test 4 Developer/2000:
Build Forms II**
—Test Content

**Managing Projects with Project
Builder™**

- List benefits of using Project Builder
- Create projects and subprojects
- Add files to a project
- Distinguish between implicit and explicit dependencies
- Describe the compile options
- Deliver a project
- Customize a Project Builder environment

Creating a Menu Module

- Identify the different components of a menu
- Create, save, and attach menu modules
- Set menu properties using the property palette
- Create menu toolbars
- Create pop-up menus

Managing Menu Modules

- Control the menu programmatically using menu built-ins
- Customize menu modules using substitution parameters
- Implement menu security using both database roles and the appropriate built-ins

Programming Function Keys

- Redefine function keys
- Determine when Key triggers should be used or avoided
- Coordinate function keys with interface controls

Responding to Mouse Events

- Describe mouse events
- Cause a form module to respond to mouse movement
- Cause a form module to respond to mouse button actions

**Controlling Windows and Canvases
Programmatically**

- Create trigger code to interact with windows
- Control windows programmatically
- Control canvases
- Design spread table to display large data blocks

Controlling Data Block Relationships

- Define block coordination
- Create and modify relations
- Describe the characteristics and principles of relation-handling code
- Implement a coordination-type toggle
- Force one commit per master record

Test 4—content continued**Building Multiple Form Applications**

- Describe relevant details of invoking forms
- Build robust multiple-form transactions
- Choose between different ways of invoking forms
- Pass data between forms using parameter lists

Defining Data Sources

- Describe the different data source types
- Base a data block on a FROM clause query
- Discuss the advantages of using a FROM clause query
- Base a data block on a stored procedure which returns a Ref cursor
- Select the appropriate data source for a data block

Working with Record Groups

- Create record groups at design time
- Create and modify record groups programmatically
- Build dynamic list items by using record groups
- Apply record groups in other useful ways
- Create and use a global record group to communicate between forms

Including Chart and Reports

- Embedded charts in a form module using the chart wizard
- Incorporate existing graphic displays in a form module
- Create and invoke reports in a form using the report wizard
- Control a report programmatically in a form

Applying Timers

- Describe timers
- Create a timer
- Modify a timer
- Delete a timer
- Handle timer expiration

Reusable Components

- List the reusable components
- Include the calendar class in an application

Using Server Features in Form Builder

- Describe Oracle Server features in Form Builder
- Partition PL/SQL program units
- Handle errors raised by the Oracle Server
- Obtain the cause of declarative-constraint violations
- Perform DDL commands using the FORM_DDL built-in subprogram

**Test 5 Developer/2000:
Build Reports
—Test Content**

Introduction to Developer/2000

- Describe the common features and benefits of Developer/2000
- Describe the Developer/2000 components
- Describe the common builder components
- Navigate around the Developer/2000 interface
- Customize the Developer/2000 session

Designing and Running Reports

- Describe the common report styles required in a business report
- Describe the structure of each style
- Run pre-built reports using the Runtime executable
- Identify the various report destinations
- View report output in the Previewer

Report Builder Concepts

- Describe the main Report executables
- Invoke Report Builder and describe its main components
- Describe the main objects in a report

Creating Reports Using the Report Wizard

- Create a simple tabular report using Report Wizard
- Describe the different methods of building the report query

- Summarize report values
- Modify the style and content of a report
- Create other report styles available in the wizard

Modifying a Report in the Live Previewer

- Describe the Live Previewer
- Modify the display of report data in the Live Previewer
- Modify the positioning of report data
- Add page numbering and current date to a report

Managing Report Templates

- Describe the template regions
- Describe the difference between default and override sections
- Modify a predefined report template
- Register a customized template in the predefined template list

Report Storage Methods

- Manage the storage of report definitions
- Compare report file types and their portability
- Convert reports to different storage types
- Upgrade report and printer definition files from Rel. 1

Test 5—content continued**Enhancing Reports Using the Data Model—Creating Queries and Groups**

- Describe the Data Model objects and their relationship
- Create groups to modify the report hierarchy
- Change the order of data in a group
- Use a group filter to eliminate data from the report
- Create supplemental rows of data, using queries
- Create a data link to link data from different queries

Enhancing Reports Using the Data Model—Creating Columns

- Describe the different types of Data Model columns
- Use a database column to display the contents of a file
- Recognize the characteristics of the three types of user-defined columns
- Create report summaries and subtotals using summary columns
- Create and populate a placeholder column

Enhancing Reports Using the Layout Model

- View and modify objects in the four different regions of a report
- Design multi-panel reports
- Describe the layout objects and their relationship
- Modify an existing report layout using the Layout Model tools
- Create variable length lines to separate tabular columns of data
- Create a button to display multimedia objects at runtime
- Create an explicit anchor to alter object positions at runtime

Modifying Properties

- Create a link file to display the contents of a file in layout field
- Modify layout properties common to all types of object
- Modify layout properties specific to one type of object

Using Report Parameters and Customizing a Parameter Form

- Create and reference a parameter to control report output
- Create a list of values for parameter input
- Use and modify a system parameter
- Build a parameter form layout to allow user entry of parameter values
- Customize a parameter form layout

Embedding a Chart in a Report

- Create and display a simple Graphics chart in a report using the chart wizard
- Display an existing Graphics chart in a report
- Modify the chart data dynamically, using parameters

Enhancing Matrix Reports

- Design a matrix Data Model
- Design a matrix Layout Model
- Display Zeros in cells with no value

Test 5—content continued**Coding PL/SQL Triggers in Reports**

- Describe the different types of triggers
- Describe sample uses of the different types of triggers
- Write and reference common code
- Create and reference a PL/SQL library

Using the Report Builder Built-In Package

- Describe the contents of the Report Builder built-in package
- Describe sample uses of procedures and functions from the package
- Output messages at runtime
- Create and populate temporary tables within a report
- Modify visual attributes dynamically at runtime

Maximizing Performance Using the Reports Server

- Describe differences between local client and remote server reporting
- Describe the Reports Server architecture
- View and schedule server-side reports in the Queue Manager
- Describe how to invoke the Reports Server ActiveX control from another application

Building Reports for Different Environments

- Build and run reports in different environments, using the MODE parameter
- Describe the considerations when building reports for different graphical user interfaces
- Recognize the settings necessary to build character mode reports
- Describe the facilities available for building reports to run in other languages

**Rel. 1 to Rel. 2 UPGRADE Test:
Developer/2000 Release 2**
New Features
—Test Content

**Managing Projects with Project
Builder**

- Identify Project Builder uses and terminology
- Describe Project Navigator features
- Create projects and subprojects
- Work with project components
- Customize the Launcher
- Add types, actions, and macros

**Creating Form Documents Using
Wizards**

- List the benefits of using Developer/2000 Wizards
- List wizard features
- Identify wizard types
- Create basic form documents using wizards

**Ensuring Consistency Across
Applications**

- Identify improvements of subclassing over referencing
- Describe and use the object library
- Describe roles of property classes, object groups, and object libraries
- Create and apply SmartClasses
- Describe template forms
- Modify object appearance with partial visual attributes
- Describe global libraries and record groups

**Representing Data Within Your
Application**

- Identify the effects of Array DML
- Identify new data block properties
- List the data sources available for queries and DML
- Determine the appropriate data sources for data blocks
- Create a data block based on a stored procedure
- Create a data block based on a nested SELECT statement

Enhancing Items

- Identify enhancements in the Form Builder interface
- Describe the image item enhancements
- Create items based on calculated fields
- Change per-instance item attributes
- Interact with ActiveX (OCX) properties at design and runtime
- Recognize boilerplate objects in the Object Navigator
- Create item labels using item prompt properties
- Implement tooltips for items
- Implement context sensitive pop-up menus
- Identify ways to include sound in your application

UPGRADE Test—content continued**Enhancing Interactivity**

- Create and edit in-place stacked canvases
- Create tab-style layouts
- Create integrated toolbar buttons for menu commands
- Display a platform-specific file dialog

Including Charts and Reports

- Include charts using the Chart Wizard
- Implement Report objects
- Base a report on a data block

Creating Reports Using the Report Wizard

- Identify report styles available in the Report Wizard
- Create reports using each of the available report styles within the Wizard
- Build queries using the query builder
- Modify reports using the Report Wizard
- Apply templates to reports
- Customize an existing template

Modifying and Enhancing Reports

- Modify the text attributes of reports
- Modify the layout of reports
- Place format masks on numeric items

- Add color, fill, and patterns to reports
- Add individual borders to layout objects
- Use direct column references in reports
- Modify properties using the property palette
- Add variable length lines
- Add a graphical display

Maximizing Performance Using the Reports Server

- Identify the benefits of client-server reporting
- Explain three-tier architecture
- Enter Reports client (R30CLI) parameters in the command line
- Enter Reports server (R30MTS) parameters in the command line
- Manager server queue using the Queue Manager

Deploying Reports on the Web

- Identify advantages of deploying reports on the Web
- Identify resources required for Web deployment
- Prepare reports for Web deployment
- Add Web link properties to reports
- View reports on the Web

Visit the Oracle Certified Professional Web site at
<http://education.oracle.com/certification>.

Contact Information

Sylvan Prometric Regional Service Centers

(Note: These telephone numbers are also listed on the Web at <http://education.oracle.com/certification.>)

Asia Pacific

Sydney, Australia Regional Service Center
+61.2.9414.3666

Europe/Middle East/Africa

Paris, France Regional Service Center
+33.1.4289.3122

Düsseldorf, Germany Regional Service Center

+49.2159.9233.50

London, England Regional Service Center

+44.181.607.9090

Latin America

Latin America Regional Service Center
+1.612.820.5200

North America

North America Regional Service Center
+1.800.891.3926

Oracle Regional Offices

Americas Headquarters

Phone +1.650.506.7000

Asia/Pacific Rim/India Headquarters

Phone +65.337.3797

Europe/Middle East/Africa Headquarters

Phone +31.30.669.9000

Japan Headquarters

Phone +81.3.5213.6666

Worldwide Web Address

<http://www.oracle.com>

<http://education.oracle.com/certification>

For step-by-step instructions on how to schedule your certification test and for an overview of the program, see the *Oracle Candidate Certification Guide: An Overview*, available from Sylvan Prometric or via the Web: <http://education.oracle.com/certification>. Or, please call: In the United States, Canada, Mexico: +1.888.31-ORACLE, Ext. 13 (+1.888.316.7225, Ext. 13). In all other countries: +1.805.775.4451, Ext. 13.



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Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065 USA

Worldwide Inquiries:
+1.650.506.7000
+1.650.506.7200 (Fax)

US Inquiries:
1.800.633.0575

<http://www.oracle.com>
<http://education.oracle.com/certification>

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