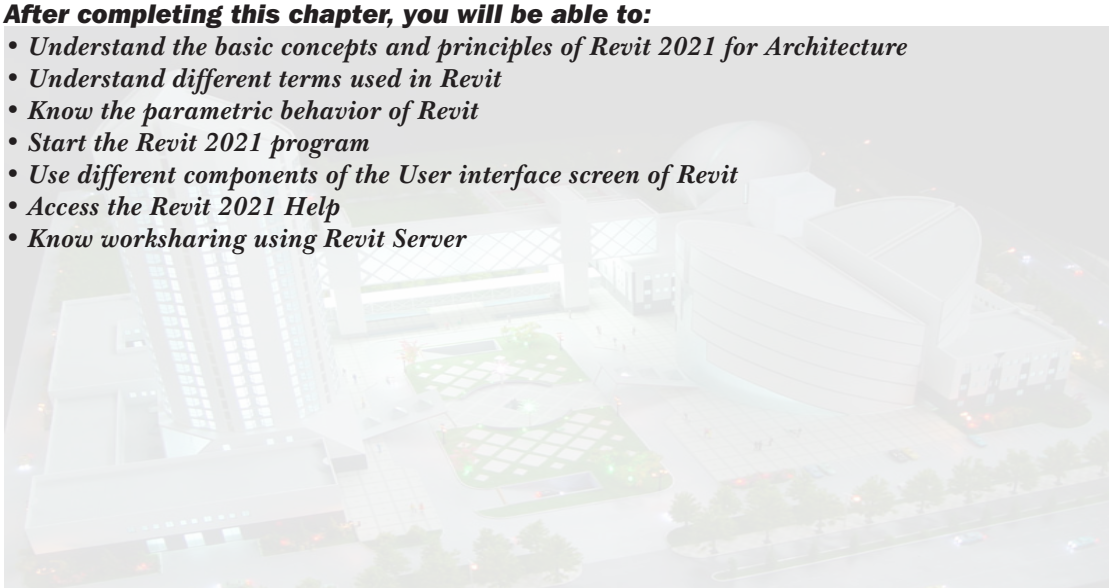
Chapter 1

Introduction to Autodesk Revit 2021 for Architecture

Learning Objectives

After completing this chapter, you will be able to:

- *Understand the basic concepts and principles of Revit 2021 for Architecture*
- *Understand different terms used in Revit*
- *Know the parametric behavior of Revit*
- *Start the Revit 2021 program*
- *Use different components of the User interface screen of Revit*
- *Access the Revit 2021 Help*
- *Know worksharing using Revit Server*



INTRODUCTION

Welcome to the realm of Revit, a powerful building modeler that has changed the outlook of the building industry about computer aided designs. Autodesk Revit is a design and documentation platform that enables you to use a single, integrated building information model to conceptualize, design, and finally document a project. Its integrated parametric modeling technology is used to create the information model of a project, and to collect and coordinate information across all its representations. In Autodesk Revit, drawing sheets, 2D views, 3D views, and schedules are a direct representation of the same building information model. Using its parametric change engine, you can modify a design at any stage of a project. The change in the project is automatically made and represented in all its views, resulting in the development of better designs, along with an improved coordination. The use of Revit provides a competitive advantage and a higher profitability to architects and building industry professionals.

Autodesk Revit AS A BUILDING INFORMATION MODELER

The history of computer aided design and documentation dates back to the early 1980s when architects began using this technology for documenting their projects. Realizing its advantages, information sharing capabilities were developed, especially to share data with other consultants. This led to the development of object-based CAD systems in the early 1990s. Before the development of these systems, objects such as walls, doors, windows were stored as a non-graphical data with the assigned graphics. These systems arranged the information logically, but were unable to optimize its usage in a building project. Realizing the advantages of the solid modeling tools, the mechanical and manufacturing industry professionals began using the information modeling CAD technology. This technology enabled them to extract data based on the relationship between model elements.

In 1997, a group of mechanical CAD technologists began working on a new software for the building industry. The Building Information Modeling (BIM) provided an alternative approach to building design, construction, and management. This approach, however, required a suitable technology to implement and reap its benefits. In such a situation, the use of parametric technology with the Building Information Modeling approach was envisaged as an ideal combination. They developed a software that was suitable for creating building projects. This software was earlier known as Autodesk Revit Architecture, and has now been changed to Autodesk Revit.

Autodesk Revit is a building design and documentation platform in which a digital building model is created using the parametric elements such as walls, doors, windows, and so on. All the building elements have inherent relationship with one another, which can be tracked, managed, and maintained by the computer.

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BASIC CONCEPTS AND PRINCIPLES

Autodesk Revit enables you to envisage and develop a building model with actual 3D parametric building elements. It provides a new approach to the architectural thought and the implementation process. In a way, it replicates the way architects conceive a building. For example, 2D CAD platforms mostly use lines to represent all elements, as shown in Figure 1-1. However, in Autodesk Revit, you can create a building model using 3D elements such as walls, floors, doors, and windows, as shown in Figure 1-2.

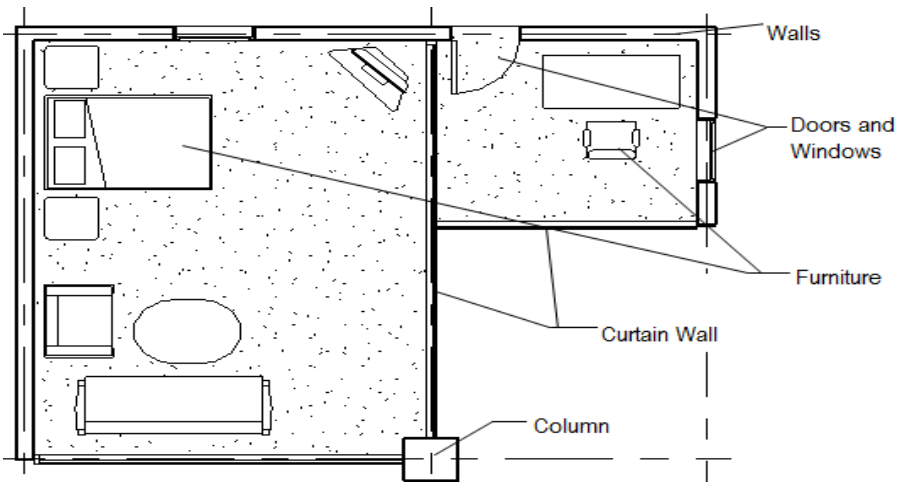

Figure 1-1 *CAD project created using 2D lines and curves*

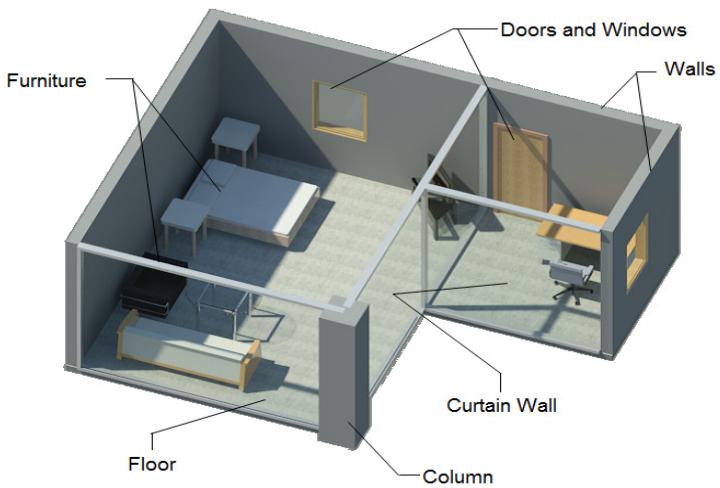

Figure 1-2 *Autodesk Revit project created using parametric building model*

Using these 3D elements, you can visualize the architectural or interior project with respect to its scale, volume, and proportions. This enables you to study design alternatives and develop superior quality design solutions. Autodesk Revit automates routine drafting and coordination tasks and assists in reducing errors in documentation. This, in turn, saves time, improves the speed of documentation, and lowers the cost for users.

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Understanding the Parametric Building Modeling Technology

A project in Autodesk Revit is created using the in-built parametric building elements. The term parametric refers to the relationship parameters between various building elements. Some relations are applied automatically to building elements while creating them, and some are user defined. For example, doors, which have an inherent parametric relationship with walls cannot be created without first creating a host wall. A door always moves with the host wall. Similarly, floors too are parametrically linked to walls. When you move walls, the floor extents are also modified automatically. Each building element has in-built bidirectional associativity with many other elements in the project.

A building information model is created using different interdependent parametric building elements such as walls, floors, roof, ceiling, stairs, ramps, curtain walls, and so on. As they are bidirectionally associated elements, any change made in one element is automatically adopted by others. The integrated building information model thus created contains all the data for a project. You can then create project presentation views such as plans, sections, elevations, and so on for documentation. As you modify the model while working in certain views, Autodesk Revit's parametric change engine automatically updates other views. This capability is, therefore, the underlying concept in Autodesk Revit.

Autodesk Revit's parametric change engine enables you to modify design elements at any stage of the project development. As changes are made immediately and automatically, it saves the time and effort in coordinating them in all other associated views which for most projects is an inevitable part of the design process. Revit's capability to coordinate between various aspects of the building design provides immense flexibility in the design and development process along with an error-free documentation.

Revit also provides a variety of in-built parametric element libraries that can be selected and used to create a building model. It also provides you with the flexibility of modifying properties of these elements or create your own parametric elements based on the project requirement.

Terms Used in Autodesk Revit

Before using Revit, it is important to understand the basic terms used for creating a building model. Various terms in Revit such as project, level, category, family, type, and instance are described next.

Autodesk Revit Project

A project in Revit is similar to an actual architectural or interior project. In an actual project, the entire documentation such as drawings, 3D views, specifications, schedules, cost estimates, and so on are inherently linked and read together. Similarly, in Revit, a project not only includes the digital 3D building model but also its parametrically associated documentation. Thus, all the components such as the building model, its standard views, architectural drawings, and schedules combine together to form a complete project. A project file contains all the project information such as building elements used in a project, drawing sheets, schedules, cost estimates, 3D views, renderings, walkthroughs, and so on. A project file also stores various settings such as environment, lighting, and so on. As data is stored in the same file, it becomes easier for Revit to coordinate the entire database.

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Levels in a Building Model

In Autodesk Revit, a building model is divided into different levels. These levels may be understood as infinite horizontal planes that act as hosts for different elements such as roof, floor, ceiling, and so on. The defined levels in a building model in most cases relate to different floor levels, or stories of the building project. Each element that you create belongs to a particular level.

Subdivisions of Elements into Categories and Subcategories

Apart from building elements, an Autodesk Revit project also contains other associated elements such as annotations, imported files, links, and so on. These elements have been divided into following categories:

Model Category : Consists of various building elements used in creating a building model such as wall, floor, ceiling, roof, door, window, furniture, stairs, curtain systems, ramps, and so on

Annotation Category : Consists of annotations such as dimensions, text notes, tags, symbols, and so on

Datum Category : Consists of datums such as levels, grids, reference planes, and so on

View Category : Consists of interactive project views such as floor plans, ceiling plans, elevations, sections, 3D views, renderings, and walkthroughs

In addition to these four categories, other categories such as **Imported**, **Workset**, **Filter**, and **Revit Categories** can also exist if the project has imported files, enabled worksets, or linked Revit projects, respectively.

Families in Autodesk Revit

Another powerful concept in Autodesk Revit is family. Family in Revit is described as a set of elements of the same category that can be grouped together based on certain common parameters or characteristics. Elements of the same family may have different properties, but they all have common characteristics. For example, **Double Hung** is a single window family, but it contains different sizes of double hung windows. Family files have a *.rfa* extension. You can load additional building component families from the libraries provided in Revit package.

Families are further divided into certain types. Type or family type, as it is called, is a specific size or style of a family. For example, **Double Hung: 36" x 48"** is a window type. All uses of the same family type in a project have same properties. Family and family types can also be used to create new families using the **Family Editor**.

Instances are the actual usage of model elements in a building model or annotations in a drawing sheet. A family type created in a new location is identified as an instance of the family

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type. All instances of the same family type have same properties. Therefore, when you modify the properties of a family type, the properties of all its instances also get modified. The family categorization of Revit elements is given below:

Model Category : Wall
Family : Basic Wall
Family type : Brick on Mtl. Studs
Instance : Particular usage of a family type

The hierarchy of building elements in Revit plays an important role in providing the flexibility and ease of managing a change in the building model. Figure 1-3 shows the hierarchy of categories and families in a typical Revit project. The following is another example of the terms described in this section.

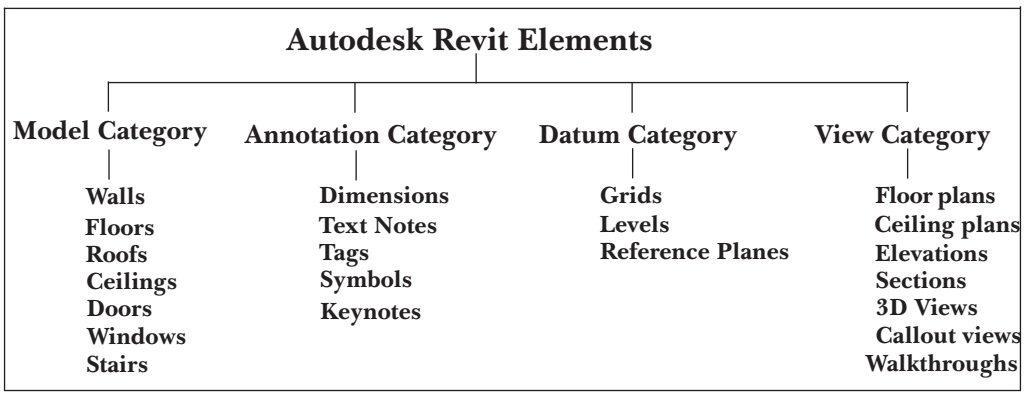

Figure 1-3 *Hierarchy of Autodesk Revit categories and families*

Creating a Building Model Using Parametric Building Elements

Another classification of categories of elements followed in Revit is based on their usage. Revit uses five classes of elements: host, component, annotation, view, and datum. Hosts are the element categories that form the basic structure of a building model and include model elements such as walls, floor, roof, and ceiling. Components are the elements that are added to host elements or act as stand-alone elements such as doors, windows, and furniture. Annotations are the 2D, view-specific elements that add content to the project documentation such as dimensions, tags, text notes, and so on. Views represent various orientations of a building model such as plans, elevations, sections, 3D views, and so on. Datum refers to the reference elements that assist you in creating a building model, which include grids, levels, reference planes, and so on.

There is no specific methodology available for creating a building model in Revit. It provides you with the flexibility of generating building geometry based on the project requirement, design complexity, and other factors. However, the following steps describe a general procedure that may be followed for creating an architectural building model using the in-built parametric elements provided in Revit.

The first step is to create the exterior walls of a building at the predefined lowest level (level 1). Next, create interior walls at that level and add components to the building model. Then, define

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the upper levels based on the story height of the building. You can also link the control height of the walls to the levels and extend the exterior walls to their full height. Next, create floors and roof using the defined levels. Add the site topography to the building model and then add site components to complete the building project. You can then create drawing sheets with the desired views for its presentation. Revit also provides tools to create rendered 3D views and walkthroughs. Figure 1-4 shows an example of a building section with various building elements and annotations.

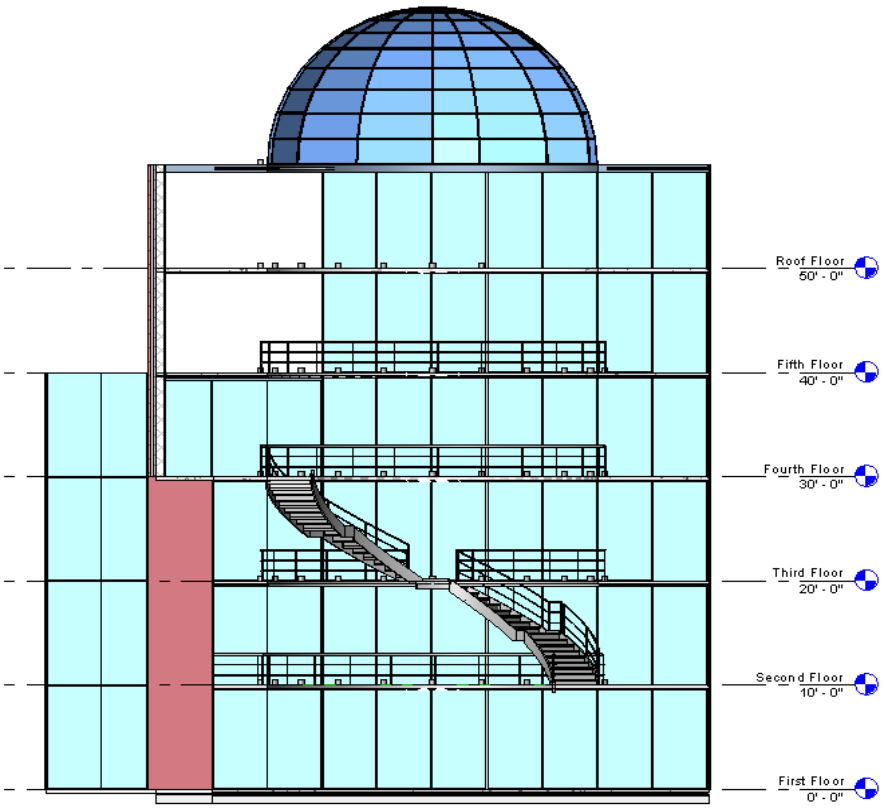

Figure 1-4 *Building section showing building elements and levels*

Visibility/Graphics Overrides, Scale, and Detail Level

Revit enables you to control the display and graphic representation of a single element or the element category of various elements in project views by using the visibility and graphics overrides tools. You can select a model category and modify its linetype and detail level. This can also be done for various annotation category elements and imported files. These settings can be done for each project view based on its desired representation. You can also hide an element or an element category in a view using the **Hide in View** and **Isolate** tools. You can override the graphic representation of an element or an element category in any view using the **Visibility/ Graphics** tool.

The scale is another important concept in a Revit project. You can set the scale for each project view by selecting it from the available list of standard scales such as 1/16"=1'0", 1/4"=1'0",

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1"=1'0", 1/2"=1'0", and so on (for imperial). As you set a scale, Revit automatically sets the detail level appropriate for it. There are three detail levels provided in an Revit project: **Coarse**, **Medium**, and **Fine**. You can also set the detail level manually for each project view. Each detail level has an associated linetype and the detail lines associated with it. The details of annotations such as dimensions, tags, and so on are also defined by the selected scale.

Extracting the Project Information

A single integrated building information is used to create and represent a building project. You can extract project information from a building model and create area schemes, schedule, and cost estimates, and then add them to the project presentation.

Revit also enables you to export the extracted database to the industry standard Open Database Connectivity (ODBC) compliant relational database tables. The use of the building information model to extract database information eliminates the error-prone method of measuring building spaces individually.

Creating an Architectural Drawing Set

After creating the building model, you can easily arrange the project views by plotting them on drawing sheets. Drawing sheets can also be organized in a project file based on the established CAD standards followed by the firm. In this manner, the project documentation can easily be transformed from the conceptual design stage to the design development stage and finally to the construction document stage. The project view on a drawing sheet is only a graphical representation of the building information model and therefore, any modification in it is immediately made in all the associated project views, keeping the drawings set always updated.

Creating an Unusual Building Geometry

Revit also helps you conceptualize a building project in terms of its volume, shape, and proportions before working with the actual building elements. This is possible by using the **Massing** tool, which enables you to create quick 3D models of buildings and conduct volumetric and proportion study on overall masses. It also enables you to visualize and create an unusual building geometry. The same massing model can then be converted into a building model with individual parametric building elements. It provides continuity in the generation of building model right from sketch design to its development.

Flexibility of Creating Special Elements

Revit provides a large number of in-built family types of various model elements and annotations. Each parametric element has the associated properties that can be modified based on the project requirement.

Revit also enables you to create the elements that are designed specifically for a particular location. The in-built family editor enables you to create new elements using family templates. This provides you with the flexibility of using in-built elements for creating your own elements. For example, using the furniture template, you can create a reception desk that is suitable for a particular location in the design.

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Creating Structural Layouts

Revit's structural tools enable you to add structural elements to a building model. An extensive in-built library of structural elements has been provided in Revit. You can add structural columns, beams, walls, braces, and so on to the project. Thus, structural consultants can also incorporate their elements in the basic architectural building model and check for inconsistency, if any.

Working on Large Projects

In Revit, you can work on large projects by linking different building projects together. For a large project that consists of a number of buildings, you can create individual buildings as separate projects and then link all of them into a single base file. The database recognizes the linked projects and includes them in the project representation of the base file.

For example, while working on a large campus of an educational institution, you can create separate project files for academic building, administration area, gymnasium, cafeteria, computer centre, and so on, and then link them into the base site plan file. In this manner, large projects can be subdivided and worked upon simultaneously.

Working in Large Teams and Coordinating with Consultants

Worksets in Revit enable the division of the building model into small editable set of elements. The worksets can be assigned to different teams working on the same project and then their work can easily be coordinated in the central file location. The effort required to coordinate, collaborate, and communicate the changes between various worksets is taken care of by computer. Various consultants working on a project can be assigned a workset with a set of editable elements. They can then incorporate their services and modify the associated elements.

For example, a high rise commercial building project can be divided into different worksets with independent teams working on exterior skin, interior walls, building core, toilet details, finishes, and so on. The structural consultants can be assigned the exterior skin and the core workset in which they can incorporate structural elements. Similarly, the rest of the teams can work independently on different worksets.



STARTING Autodesk Revit 2021

You can start Autodesk Revit 2021 by double-clicking on its shortcut icon located on the desktop. Alternatively, you can start Autodesk Revit 2021 from the taskbar. To do so, choose the **Start** button; a menu is displayed. Choose **Autodesk > Revit 2021,** as shown in Figure 1-5; the interface screen will be displayed, as shown in Figure 1-6.

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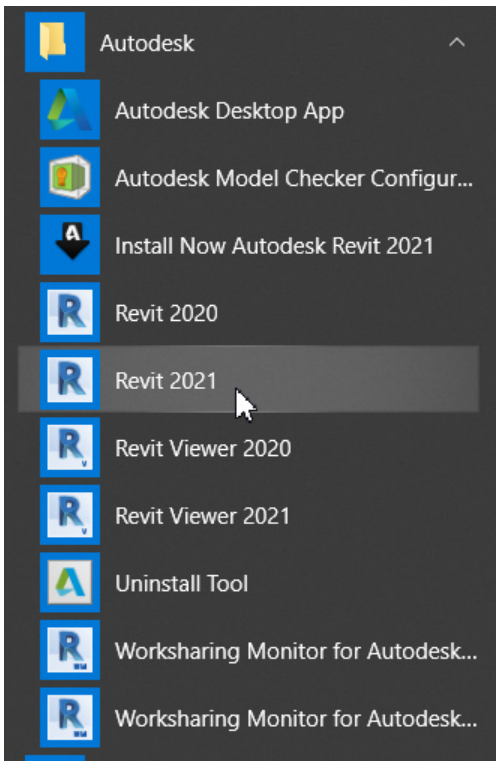

Figure 1-5 *Starting Revit 2021 from the taskbar*

Note

The path for starting Revit depends on the operating system being used.

The interface screen has four sections: **Models**, **Families**, **Learn,** and **BIM 360**. The options in the **Models** section are used to open an existing model, a new model, and an existing template. The options in the **Families** section are used to open a new or an existing family. You can also invoke the Conceptual Mass environment from this section to create a conceptual mass model.

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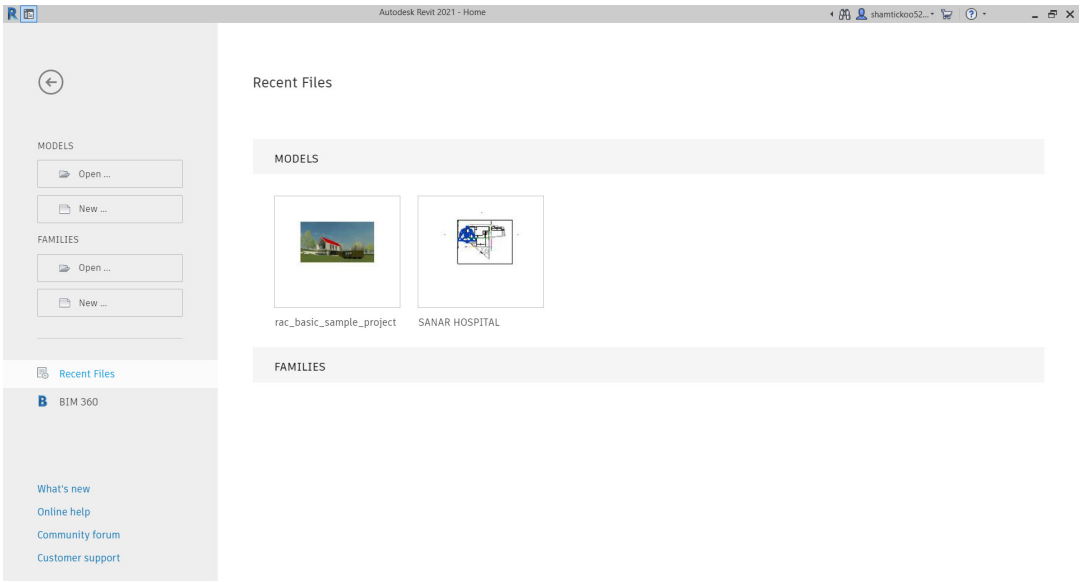

Figure 1-6 *The interface of Autodesk Revit 2021*

In the **Learn** section, you can choose the **What's New?** option to get information about the new tools and features in Revit 2021.

When you click on the **What's New?** option, you are directed to the **Autodesk Revit 2021** page that has a list of videos of newly added features in Revit. You can click on a link to view the corresponding video.

You can choose the **Essential Skills Videos** and **Getting Started Video** options to view the videos related to basic, advance concepts, and modelling in Revit 2021. These videos and their associated information help you to learn about different features and capabilities of the software. Moreover, you can choose the **Autodesk App Store** option from the **InfoCenter** to access various add-ons that can be used to enhance the productivity of Revit. On choosing this option, the **Autodesk App Store** page will be displayed. In this page, various links are available as add-ons which can be used in Revit applications. In the **Revit Community** option of the **InfoCenter** section, you can access information related to various communities and their contribution in the form of articles, tutorials, and videos.

In addition, you can choose the **Help** option from the **InfoCenter** to get help on various tools. When you choose this option, you will be directed to *https://help.autodesk.com/view/RVT/2021/ENU/*. Also, the Autodesk Revit 2021 page with the **Welcome to Revit 2021 Learning** area will be displayed. To access information related to additions and enhancements in **Revit 2021** release, you can expand the **What's New** node from the left pane and then click on the What's New link. On doing so, the **What's New** page will be displayed with various links. You can visit the links to learn about enhancements in Revit 2021.

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The new interface screen of Autodesk Revit 2021 has been enhanced to provide better experience for navigating BIM 360 projects. Now, you can access your projects stored in BIM 360 directly from the interface screen of Revit 2021 by clicking on the **BIM 360** button.

Some new features are also added to the interface screen of Autodesk Revit 2021. These include **Community Forum** and **Customer Support** options. When you click on the **Community Forum** option, Revit 2021 directs you to *https://forums.autodesk.com/t5/revit-products/ct-p/2003* page. On this page, you can access Autodesk's Revit Forums to share your knowledge, ask questions, collaborate on ideas, and explore popular Revit topics. When you click on the **Customer Support** option, you are directed to *https://knowledge.autodesk.com/contact-support* page. This page provides you the information on purchasing, downloading, installing and troubleshooting of various softwares. This page also assists you in managing your Autodesk account and your software license.

In the **Models** section, choose the **Open** option; the **Open** dialog box will be displayed. Browse to the desired location in the dialog box and select the file. Now, choose the **Open** button to open the file.

To open a new model file, choose the **New** option from the **Models** section. Alternatively, choose **New > Project** from the **File** menu; the **New Project** dialog box will be displayed. In this dialog box, you can select the desired template from the **Template file** drop-down list or you can browse the other template files by using the **Browse** button from the **Template File** area. When you choose the **Browse** button, the **Choose Template** dialog box will be displayed. In this dialog box, make sure the **Project** radio button is selected, and then choose the **OK** button; a new project file will open and the interface screen will be activated.

USER INTERFACE



Autodesk Revit has ribbon interface. The ribbon which contains task-based tabs and panels, streamlines the architectural workflow and optimizes the project delivery time. In Revit, when you select an element in the drawing area, the ribbon displays a contextual tab that comprises of tools corresponding to the selected element. The interface of Autodesk Revit is similar to the interfaces of many other Microsoft Windows based programs. The main parts in the Revit interface are **Ribbon**, **Options Bar**, **Project Browser**, **Drawing Area**, **Status Bar**, and **View Control Bar**, as shown in Figure 1-7.

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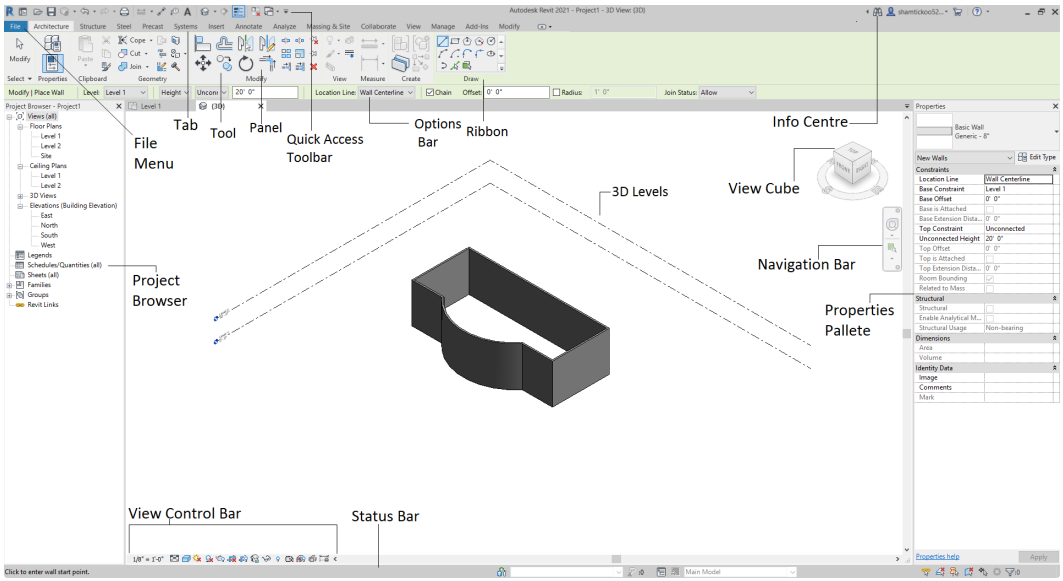

Figure 1-7 *The Autodesk Revit 2021 user interface screen*

Invoking Tools

To perform an operation, you can invoke the required tools by using any one of the following two options:

Ribbon: You can invoke all necessary tools from the ribbon.

Shortcut Keys: Some tools can also be invoked by using the keys on the keyboard.

Title Bar

The Title bar, docked on the top portion of the user interface, displays the program's logo, program's name of the current project, and the view opened in the viewing area. **Project 1- Floor Plan: Level 1** is the default project and view.

Ribbon

The ribbon, as shown in Figure 1-8, is an interface that is used to invoke tools. When you open a file, the ribbon is displayed at the top in the screen. It comprises of task-based tabs and panels, refer to Figure 1-8, which provide all the tools necessary for creating a project. The tabs and panels in the ribbon can be customized according to the need of the user. This can be done by moving the panels and changing the view states of the ribbon (changing the ribbon view state is discussed later in this chapter). The ribbon contains buttons, drop-downs, panels, tabs, and tools.

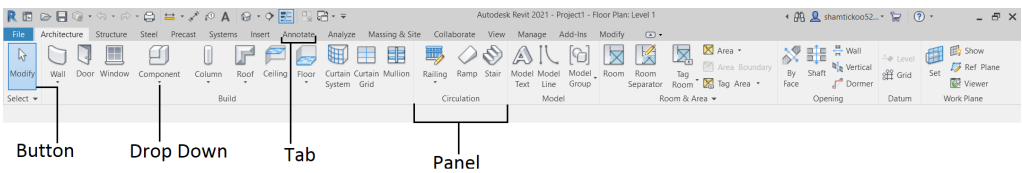

Figure 1-8 *Different components of a ribbon*

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Moving the Panels

In the ribbon, you can move a panel and place it anywhere on the screen. To do so, press and hold the left mouse button on the panel label in the ribbon and drag it to some desired place on the screen. Next, use the tools of the moved panel and place the panel back to the ribbon. To do so, place the cursor on the moved panel and choose the **Return Panels to Ribbon** button from the upper right corner of this panel, as shown in Figure 1-9; the panel will return to the ribbon.

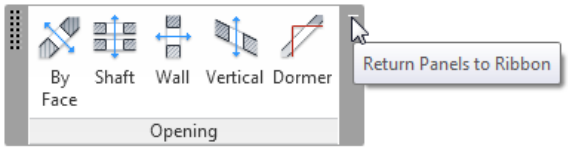

Figure 1-9 *Choosing the* ***Return Panels to Ribbon*** *button*

Changing the View States of the Ribbon

The ribbon can be displayed in three view states by selecting any of the following four options: **Minimize to Tabs**, **Minimize to Panel Titles**, **Minimize to Panel Buttons**, and **Cycle through All**. To use these options, move the cursor and place it over the second arrow on the right of the **Modify** tab, refer to Figure 1-10 in the ribbon; the arrow will be highlighted. Now, click on the down arrow; a flyout will be displayed, as shown in Figure 1-10. In this flyout, you can choose the **Minimize to Tabs** option to display only the tabs in the ribbon. If you choose the **Minimize to Panel Titles** option, the ribbon will display the titles of the panels along with the tabs. You can choose the **Minimize to Panel Buttons** option to display the panels as buttons in the ribbon along with tabs.

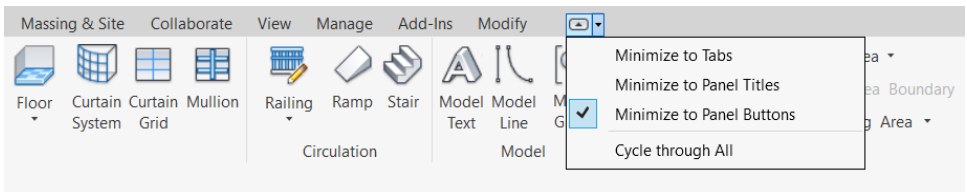

Figure 1-10 *Various options in the flyout for changing the view state of the ribbon*

Tip

Tooltips appear when you rest the cursor over any of the tool icons in the ribbon. The name of the tool appears in the box helping you to identify each tool icon.

Note

If the view state of the ribbon is changed, place the cursor over the first arrow at the right of the ***Modify*** *tab, the* ***Show Full Ribbon*** *tooltip will be displayed. Click on the arrow; full ribbon will be displayed.*

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The following table describes various tabs in the ribbon and their functions:

Tab	Description
Architecture	Contains tools for creating architectural elements for a project
Structure	Contains tools for creating structural elements in a project
Steel	Contains tools for creating steel structure and their connections details in a project
Precast	Contains tools to create precast assemblies and drawings
Systems	Contains tools for creating mechanical elements in a project
Insert	Contains tools to insert, link, and manage secondary files such as raster image files, CAD files or PDFs
Annotate	Contains tools for documenting a building model such as adding texts and dimensions
Analyze	Contains tools for energy analysis of the project
Massing & Site	Contains tools for modeling and modifying conceptual mass and site elements
Collaborate	Contains tools for collaborating the project with other team members (internal and external)
View	Contains tools used for managing and modifying the current view and also for switching views
Manage	Contains tools for specifying the project and system parameters and project settings
Add-Ins	Contains all the installed Add- Ins (Plug-Ins)
Modify	Contains tools for editing elements in the model

Contextual Tabs in the Ribbon

These tabs are displayed based on the tool or the element selected. These tabs contain a set of tools or buttons that relate only to a particular tool or element. For example, when you invoke the **Window** tool, the **Modify | Place Window** contextual tab is displayed. This tab shows ten panels: **Select**, **Properties**, **View**, **Measure**, **Geometry**, **Clipboard**, **Create**, **Modify**, **and Mode**. The **Select** panel contains the **Modify** tool. The **Properties** panel contains the **Properties** button and the **Type Properties** tool. The **Mode** panel has some necessary tools that are used to load model families or to create the model of a window in a drawing. The other panels, apart from those discussed above, contain the tools that are contextual and are used to edit elements when they are placed in a drawing or selected from a drawing for modification.

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File Menu

This menu is displayed on choosing the **File** button from the ribbon, refer to Figure 1-11. It contains tools that provide access to many common file actions such as **Open**, **Close**, and **Save**. You can also invoke this menu by using the keyboard shortcut ALT+F.

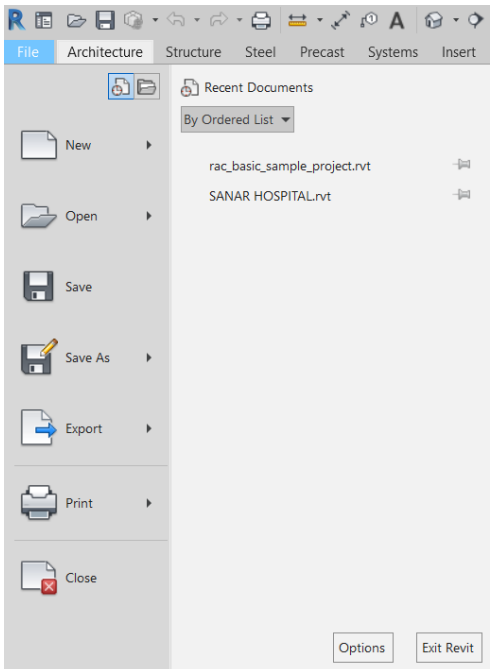

Figure 1-11 *The* ***File*** *menu*

Quick Access Toolbar

The **Quick Access Toolbar**, as shown in Figure 1-12, contains the options to undo and redo changes, open and save a file, create a new file, and so on.

By default, the **Quick Access Toolbar** contains the following options: **Open**, **Save**, **Redo**, **Undo**, and others. You can customize the display of the **Quick Access Toolbar** by adding more tools and removing the unwanted tools. To add a tool or a button from the panel of the ribbon to the **Quick Access Toolbar**, place the cursor over the button; the button will be highlighted. Next, right-click; a flyout will be displayed. Choose the **Add to Quick Access Toolbar** from the flyout displayed; the highlighted button will be added to **Quick Access Toolbar**. The **Quick Access Toolbar** can be customized to re-order the tools displayed in it. To do so, choose the down arrow next to the **Switch Windows** drop-down, refer to Figure 1-12; a flyout will be displayed. Choose the **Customize Quick Access Toolbar** option located at the bottom of the flyout; the **Customize Quick Access Toolbar** dialog box will be displayed. Use various options in this dialog box and choose the **OK** button; the **Customize Quick Access Toolbar** dialog box will close and the tools in the **Quick Access Toolbar** will be re-ordered.

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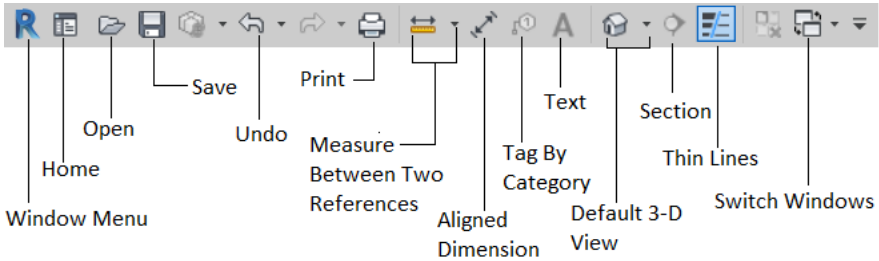

*Figure 1-12 The **Quick Access Toolbar***

InfoCenter

You can use the **InfoCenter** to search the information related to Revit Help, display the **Communication Center** panel for subscription services and product updates, and display the **Favorites** panel to access saved topics. Also in the **InfoCenter**, you can use the **Autodesk 360** and the **Autodesk App Store** options to log-in to **Autodesk 360** and **Autodesk Exchange Apps** pages. Figure 1-13 displays various tools in the **InfoCenter**.

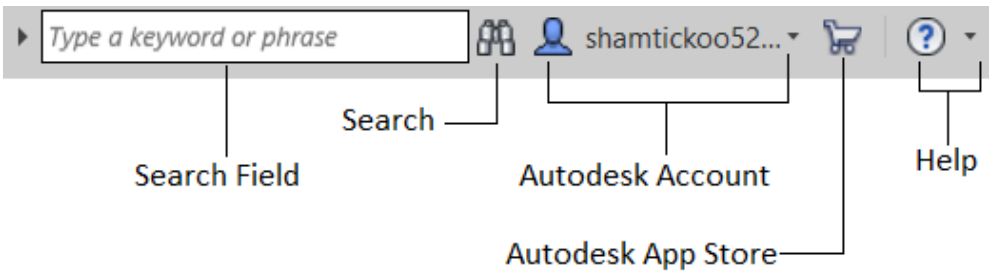

*Figure 1-13 The **InfoCenter***

Status Bar

The **Status Bar** is located at the bottom of the interface screen. When the cursor is placed over an element or component, the **Status Bar** displays the name of the family and type of the corresponding element or components. It also displays prompts and messages to help you use the selected tools.

View Control Bar

The **View Control Bar** is located at the lower left corner of the drawing window, as shown in Figure 1-14. It can be used to access various view-related tools. The **Scale** button shows the scale of the current view. You can choose this button to display a flyout that contains standard drawing scales. From this flyout, you can then select the scale for the current view. The **Detail Level** button is used to set the detail level of a view. You can select the required detail level as **Coarse**, **Medium**, and **Fine**. Similarly, the **Visual Style** button enables you to set the display style. The options for setting the display style are: **Wireframe**, **Hidden Line**, **Shaded**, **Consistent Colors**, **Realistic**, and **Raytrace**.

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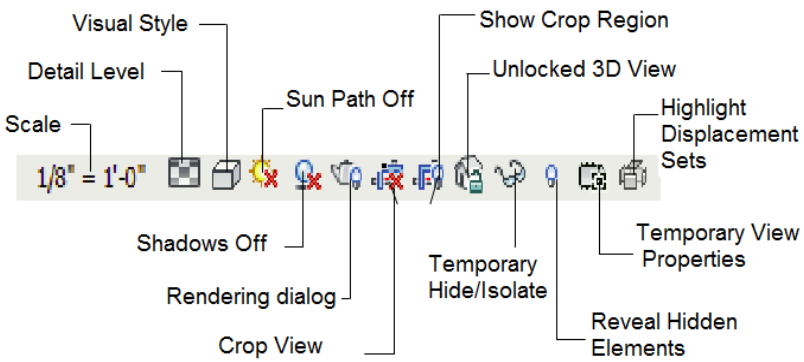

Figure 1-14 The View Control Bar

Options Bar

The **Options Bar** provides information about the common parameters of component type and the options for creating or editing of building elements. The **Options Bar** changes its appearance based on the type of component selected or being created. You can also modify the properties of the component by entering a new value in the edit box for the corresponding parameter in the **Options Bar**. For example, the **Options Bar** for the **Wall** tool displays various options to create a wall, as shown in Figure 1-15.

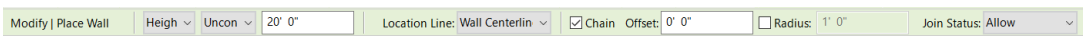

*Figure 1-15 The **Options Bar** with different options to create a wall*

Type Selector

The **Type Selector** drop-down list is located in the **Properties** palette of the currently invoked tool. For example, if you invoke the **Wall** tool, all the properties of the wall will be displayed in the **Properties** palette. In the **Properties** palette, you can use the **Type Selector** drop-down list to select the required type of the wall. The options in the **Type Selector** drop-down list keep on changing based on the current function of the tool or the elements selected. When you place an element or a component in a drawing, you can use the **Type Selector** drop-down list to specify the type of element or component. You can also use this drop-down list to change the existing type of a selected element to a different type. In Revit, you can add the **Type Selector** drop-down list to the **Quick Access Toolbar**. To do so, right-click on the down arrow on the right in the **Type Selector** drop-down list in the **Properties** palette; a flyout will be displayed. Choose the **Add to Quick Access Toolbar** option from the flyout.

Drawing Area

The Drawing Area is the actual modeling area where you can create and view the building model. It covers the major portion of the interface screen. You can draw various building components in this area using the pointing device. The position of the pointing device is represented by the cursor. The Drawing Area also has the standard Microsoft Windows functions and buttons such as close, minimize, maximize, scroll bar, and so on. These buttons have the same function as that of the other Microsoft Windows-based programs.

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Project Browser

The **Project Browser** is located below the ribbon. It displays project views, schedules, sheets, families, and groups in a logical, tree-like structure, as shown in Figure 1-16, and helps you open and manage them. To open a view, double-click on the name of the view; the corresponding view will be displayed in the drawing area. You can close the **Project Browser** or dock it anywhere in the drawing area.

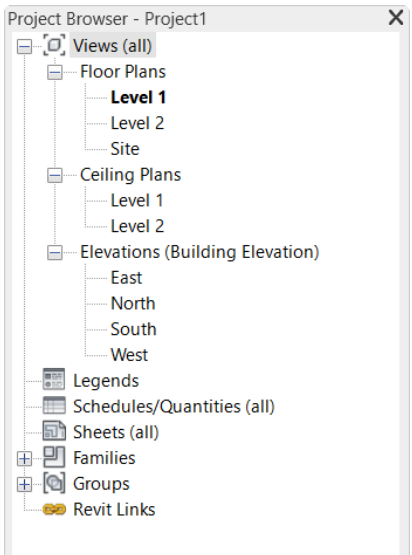

Figure 1-16** The **Project Browser



Note

*If the **Project Browser** is not displayed on the screen, choose the **View** tab from the ribbon and then click on the **User Interface** drop-down from the **Windows** panel. Next, select the **Project Browser** check box from the flyout displayed.*

The **Project Browser** can be organized to group the views and sheets based on the project requirement. For example, while working on a large project with a number of sheets, you can organize the **Project Browser** to view and access specific sheets.



Note

*In the **Project Browser**, you can expand or collapse the view listing by selecting the '+' or '-' sign, respectively. The current view in the drawing window is highlighted in bold letters. The default project file has a set of preloaded views.*

Keyboard Accelerators

In Revit, accelerator keys have been assigned to some of the frequently used tools. These keys are shortcuts that you can type through the keyboard to invoke the corresponding tool. Accelerator keys corresponding to a tool appear as a tooltip when you move the cursor over the tool. In Revit 2021, you can export all commands (even if they do not have shortcut keys assigned) to a XML file. You can further edit the XML file to assign shortcut keys to commands, and then import them back to be used in Revit.

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Tip

As you get accustomed to using Revit, you will find these ***Keyboard Accelerators*** *quite useful because they save the effort of browsing through the menus.*

Properties Palette

The **Properties** palette, as shown in Figure 1-17, is a modeless interface, which displays the type and element properties of various elements and views in a drawing. The **Properties** palette is dockable and resizable, and it supports multiple monitor configurations. The **Properties** palette is displayed in the Revit interface by default and it shows the instance properties of an active view. When you select an element from a drawing, the **Properties** palette displays its instance properties. You can also access the **Type Properties** of the selected element from the **Properties** palette. To do so, choose the **Edit Type** button from the palette; the **Type Properties** dialog box will be displayed. In this dialog box, you can change the **Type Properties** of the selected element. In the **Properties** palette, you can assign a type to a selected element in a drawing from the **Type Selector** drop-down list. In Revit, you can toggle the display of the **Properties** palette in its interface. Choose the **Properties** button in the **Properties** panel of the **Modify** tab to hide it. Similarly, you can choose the **Properties** button to display the palette if it is not visible in the interface.

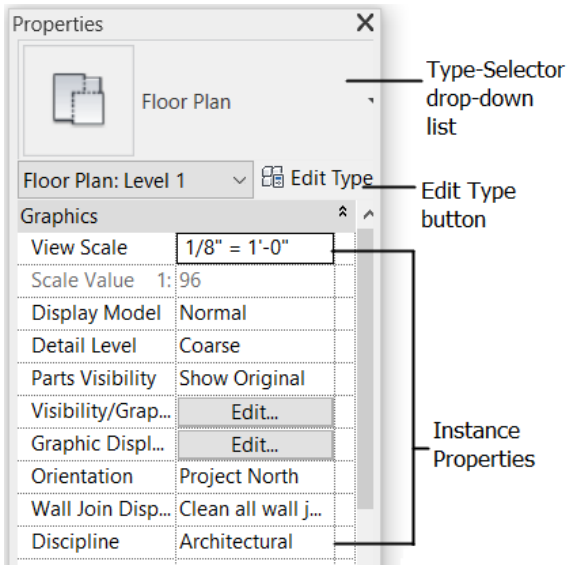

Figure 1-17 *The* ***Properties*** *palette*

DIALOG BOXES

Certain Revit tools when invoked display a dialog box. A dialog box is a convenient method of accessing and modifying the parameters related to that tool. For example, when you choose **Save As > Project** from the **File** menu, the **Save As** dialog box will be displayed, as shown in Figure 1-18. A dialog box consists of various parts such as dialog label, radio buttons, text or edit boxes, check boxes, slider bars, image box, and tool buttons, which are similar to other windows-based programs. Some dialog boxes contain the [**...**] button. On choosing such buttons, another related dialog box will be displayed. There are certain buttons such as **OK**, **Cancel**, and **Help**, which appear at the bottom of most of the dialog boxes. The names of the buttons imply their respective functions. The button with a dark border is the default button.

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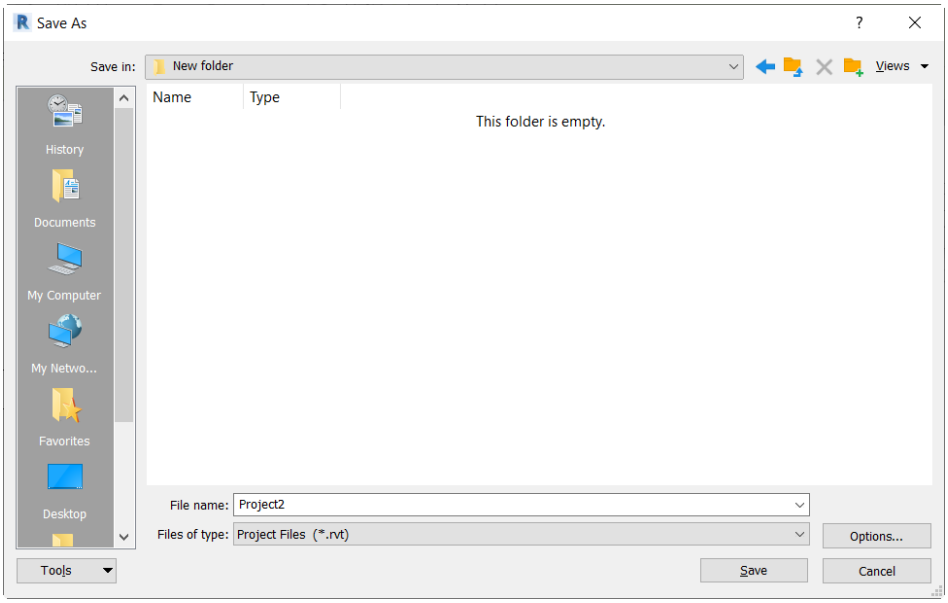

Figure 1-18 *The* ***Save As*** *dialog box*

MULTIPLE DOCUMENT ENVIRONMENT

The multiple document environment feature allows you to open more than one project at a time in a single Revit session. This is very useful when you want to work on different projects simultaneously and make changes with reference to each other.

Sometimes you may need to incorporate certain features from one project into the other. With the help of multiple document environments, you can open multiple projects and then use the **Cut**, **Copy**, and **Paste** tools from the **Clipboard** panel of the **Modify (type of element)** tab to transfer the required components from one project to another. These editing tools can also be invoked by using the CTRL+C and CTRL+V keyboard shortcuts.

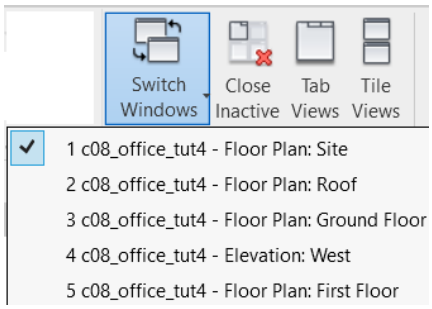

Figure 1-19 *Selecting an option from the* ***Switch Windows*** *drop-down*

To access the opened projects, choose the **Switch Windows** drop-down from the **Windows** panel of the **View** tab; a menu will be displayed showing the name of different project files opened, as shown in Figure 1-19. Like other Microsoft Windows-based programs, you can select and view the opened projects using the **Tile** and **Tab** tools from the **Windows** panel of the **View** tab. Figure 1-20 shows the tab view of projects.

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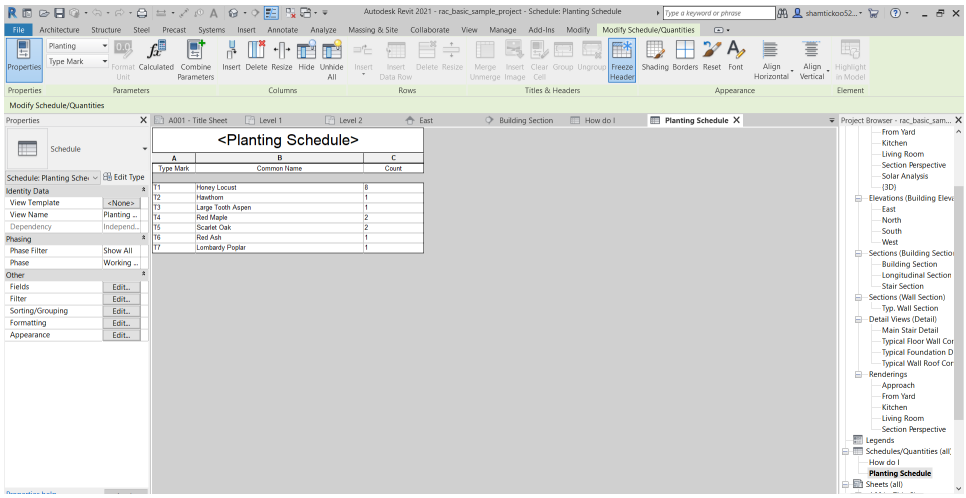

Figure 1-20 *The Tab view of the projects*

INTEROPERABILITY OF Autodesk Revit

The models or geometries created in Revit can easily be exported to AutoCAD based programs, such as 3ds Max and Max Design in the DWG file format. This enables you to visualize and create photorealistic exterior and interior renderings for your project designs. You can also transfer drawings from Revit to Trimble SketchUp to visualize your projects in a better way.

Revit follows a wide range of industry standards and supports various CAD file formats such as DWG, DXF, DWF, DGN, FBX, and SAT. For image files, it supports JPG, TIFF, BMP, PNG, AVI, PAN, IVR, and TGA file formats. Besides these, the formats that are supported by Revit include ODBC, HTML, TXT, gbXML, XLS, and MDB. Revit is compatible with any CAD system that supports the DWG, DXF, or DGN file format. Revit can import the models and geometries as ACIS solids. This enables designers to import models from AutoCAD Architecture and AutoCAD MEP (Mechanical, Electrical, and Plumbing) software and to link and import 3D information to Revit. This feature makes Revit an efficient, user-friendly, and compatible software.

In Revit, you can directly link the files into 3ds Max and load selected views in it. You can also override material in 3ds Max and retain its settings when you reload Revit link file. Also, in 3ds Max, you can add high level of details to the curved objects to make them smooth. Microstation is interoperable with Revit. Therefore, the Microstation files can be imported to the Revit project. In addition to this, mapping functionality for levels, lines, line weights, patterns, and texts and fonts is added to export DGN workflow.

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BUILDING INFORMATION MODELING AND Autodesk Revit

Building Information Modeling (BIM) is defined as a design technology that involves creation and use of coordinated, internally consistent, and computable information about a building project in design and construction. BIM covers spatial relationships, geographic information, quantities, and properties of building components. Using this technology, you can demonstrate the entire life cycle of a building project starting from the process of construction, facility operation, and information about quantities and shared properties of elements. BIM enables the circulation of virtual information model from the design team to contractors and then to the owner, thereby adding changes and their knowledge to update the model at each stage of transfer. The ability to keep information up-to-date and make it available in an integrated digital environment enables the architects, owners, builders, and engineers to have clear vision of the project before the commencement of actual construction. It enables them to make better and faster decisions as well as to improve the quality and profitability of projects. Autodesk Revit is a specially designed platform based on BIM. Revit is the best example of the BIM technology. Revit's parametric model represents a building as an integrated database of coordinated information. In Revit, change anywhere is change everywhere. Any change made in your project at any stage is reflected in the entire project, and also, due to the parametric behavior of elements, the project is updated automatically according to the changes made anywhere in the project. Also, the integration of Revit with the available in-built commercial tools such as solar studies, material takeoffs, greatly simplifies the project design and reduces the time consumed by these analyses, thereby enabling faster decision making.

Autodesk Revit 2021 HELP

Autodesk Revit provides help to easily understand various tools and methods used in it. In Autodesk Revit 2021, you can access online help documentation. To access the help feature, click on the down arrow on the right of the **InfoCenter**; a flyout will be displayed. Next, choose the **Help** option, as shown in Figure 1-21. Various options to access the help are discussed next.

Using the Revit 2021 Help

You can access Autodesk Revit 2021 help when you are online. To do so, choose the **Help** tool from the **InfoCenter**; the **Autodesk Revit 2021** page will be displayed, as shown in Figure 1-22. In this page, there are several tabs that contain information of help topics. These tabs are useful to understand the basic concepts of Revit.

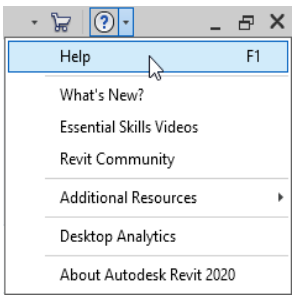

Figure 1-21 *A drop-down menu displaying help options*

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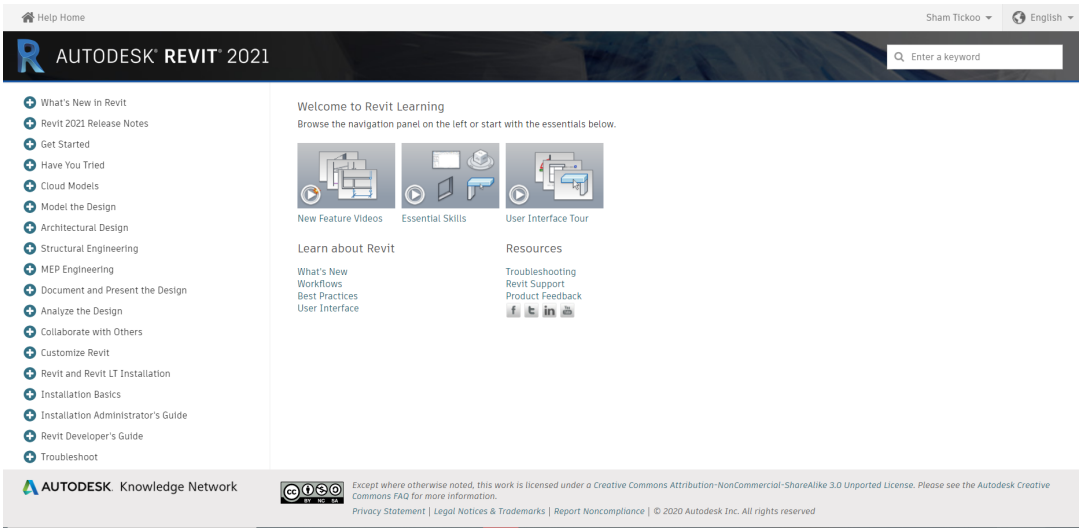

Figure 1-22 *The* ***Revit Help*** *page*

WORKSHARING USING REVIT SERVER

Worksharing is a method of distributing work among team involved in a project, and accomplishing it within the stipulated period of time. In worksharing, each person involved in the project is assigned a task that has to be accomplished by proper planning and by coordinating with the other members of the team.

In a large scale building project, worksharing helps in finishing a project in time and meeting the quality requirements that are set during the process. Generally, in a large scale building project, worksharing is based on the specialization of work. The professionals such as structural engineers, architects, interior architects, and MEP engineers are involved in their respective fields to accomplish the project. So, the distribution of work at the primary stage is made on the basis of the area of specialization. Each professional has his own set of work to perform for the accomplishment of the project.

You can apply server-based worksharing with the help of Revit Server as it is a server based application. Revit Server uses a central server and multiple local servers for collaborating across a Wide Area Network (WAN). The central server hosts the central model of a workshared project and remain accessible to all the team members over the Wide Area Network. Similarly, the local server is accessible to all team members in a Local Area Network (LAN). The local server hosts a local updated copy of the central model. In the Worksharing environment, the team members are not aware of the local server, as it is transparent in their daily operations. Refer to Figure 1-23 for the network model of Revit Server.

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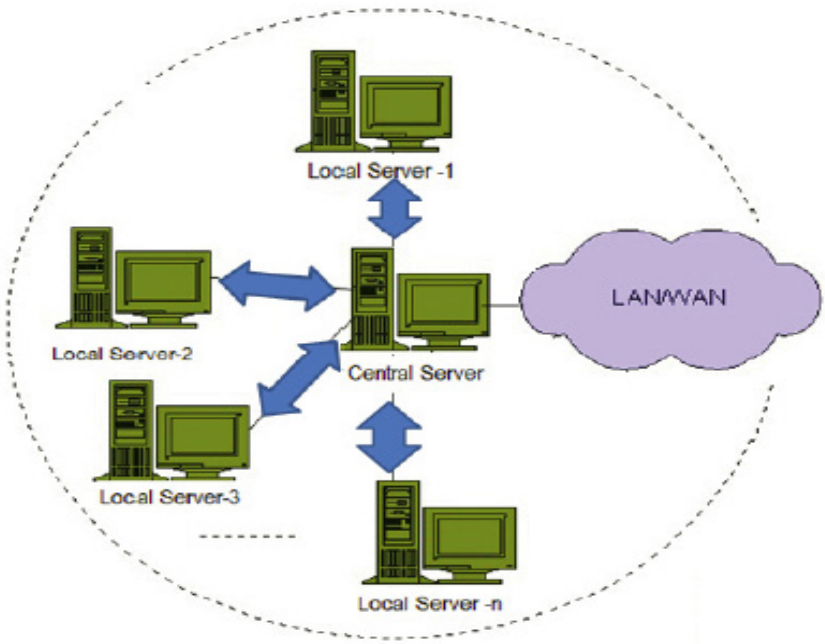

Figure 1-23 *The network model of Revit Server*

In Worksharing environment, a team member starts working on the local model of the central model. The local model will be saved in the computer of the team member. As the team member works, the local server requests updated information from the central model on the central server using available network capacity to transfer the data over the WAN. The updated version of the model is stored on the local server, so the updates are readily available when a team member requests them.

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Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. In Revit, you can access offline help only. (T/F)

2. You cannot import 3ds Max file into Revit. (T/F)

3. You can do parametric modeling in Revit. (T/F)

4. You can control the display of the elements in Revit. (T/F)

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Answers to Self-Evaluation Test

1. **F**, **2**. **F**, **3**. **T**, **4**. T