Technical Writing Samples

By Forrest Moulin

This document contains over 40 pages of technical documentation written for academic and professional settings. Some of the content within this document has been utilized as examples in the curriculum for Technical Writing (ENGL 202C) at Pennsylvania State University World Campus. Enjoy!

How Touch Screen Displays Work

For Business Leaders Interested in Utilizing Touch Screen Technologies

By Forrest Moulin

This document describes how touch screen displays function so that business leaders can make informed decisions before purchasing or implementing this technology. The following technical description covers the key components that allow touch screens to be used to accomplish business tasks. Although there are multiple types of touch screen displays, this document will describe two types: *resistive* and *capacitive* displays. Furthermore, the touch screen interaction process will be discussed to provide a clearer idea of how the key components send signals to each other.

With the growing global market for touch screen displays reaching over $60 Billion USD in 2020, banking, electronics, retail, and other businesses have been utilizing these technologies more frequently (Figure 1). This document provides business leaders with a better understanding of how these devices would function in a business environment. By having more knowledge of touch screen functionality, business leaders can decide whether this technology may be beneficial to their current or future business operations.

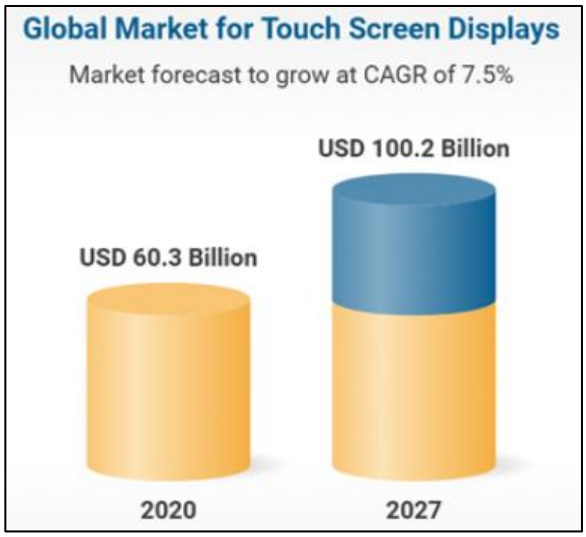


Figure 1: Global Market for

Touch Screen Displays

Touch screen displays are found in both portable and stationary electronic devices, allowing them to be used in a wide variety of scenarios. While a standard electronic display is typically just an **output device**, a touch screen is an **input/output (I/O) device**. By receiving and sending data, these displays provide a high degree of functionality for user interactions without having to rely on other auxiliary accessories such as keyboards or mice. For example, touch screen display users typically have access to tap buttons, swipe windows, or scroll through pages by using physical gestures on the screen itself.

Output device: hardware that sends digital data or information to a user or another device

Input/output (I/O) device: hardware that sends and receives digital data or information to or from a user or another device

Due to their dual nature of sending and receiving data, these types of displays provide a channel that can enhance interactions between users and electronic devices. Additionally, if the touch screen's electronic device is connected to another device or a network, there is potential for users to accomplish a multitude of real-world tasks. In the business setting, touch screen displays are commonly utilized to send instant messages, give presentations, create digital designs, or even conduct sales transactions.

Figure 2: Touch screen iPad Graphical User Interface

Overall, touch screen displays provide greater accessibility than standard displays because they provide an alternative way of using an electronic device. The primary purpose of these displays is to provide access to a device's **graphical user interface (GUI)** through tactile gestures (Figure 2). However, it is important to note that touch screen displays may not be fully accessible for certain persons with disabilities that affect the use of their hands or sight.

Graphical user interface (GUI): A set of menus, icons, and other visual indicators displayed by an electronic device

Key Components of Touch Screen Displays

While there are many variations of touch screens, most touch screen displays require a few key components to operate effectively. There are both outer and inner parts of the display:

Outer Components

- **Protective Cover/Outer Film**
  Depending on the type of touch screen display, there could be a protective cover or a film on the outermost part of the screen. This component's purpose is to protect the inner components from physical damage from water, debris, and impacts.

- **Touch Sensors/Electrode Films**
  When the screen is touched, there must be sensors that physically register the interaction before the electronic device processes that input to accomplish a task.

- **Glass**
  A layer of glass is positioned between the touch sensors and the display to allow the sensors to function. It also allows light to pass from the display to the user.

- **Display**
  The display portion provides visual output for users to gather information from the device. Located beneath the glass layer, the display is the innermost outer component. LCD and LED technology are commonly used in displays.

Inner Components

- **Motherboard**
  A motherboard contains computer hardware that allows digital data to be sent, received, and processed. Smartphones, computers, and other electronic devices rely on this component. This physical hardware also stores software such as the operating system.

- **Controller**
  Controllers are usually attached to the motherboard. They receive data from touch sensors to determine the coordinates of the touches

- **Software Driver**
  Specific software called a software driver allows an electronic device's operating system to communicate with the touch screen.

Resistive vs. Capacitive Touch Screens

Resistive Touch Screens

With resistive technology, the user touches a flexible film, which squeezes together two inner layers of **electrode films** (Figure 3). When these electrode films make contact, there is a change in **voltage**, which is a measure of pressure of electric current. This design allows resistive touch screens to receive input from other objects besides hands or fingers, including gloves.

> **Electrode film:** A transparent film that can be supplied an electric current by an electronic device

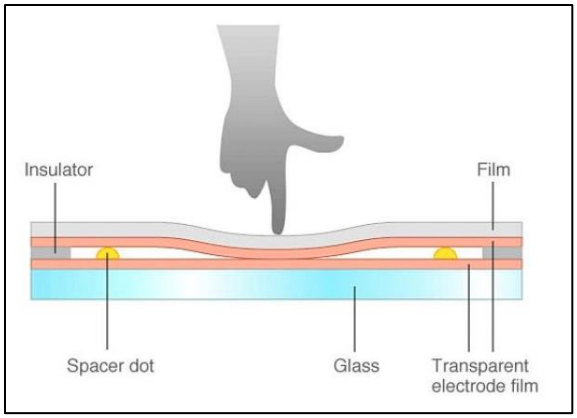


Figure 3: Resistive Touch Screen Layout

Capacitive Touch Screens

In capacitive technology, the small electrical charge from the electrode film travels through the protective cover to the point of contact (Figure 4). Capacitive screens must be touched by an object that can receive a small amount of electric current, such as a hand, a stylus, or a special glove.

> **Note**: Capacitive touch screens require little physical pressure, which allows them to be utilized for gestures such as on-screen typing, scrolling, and swiping.

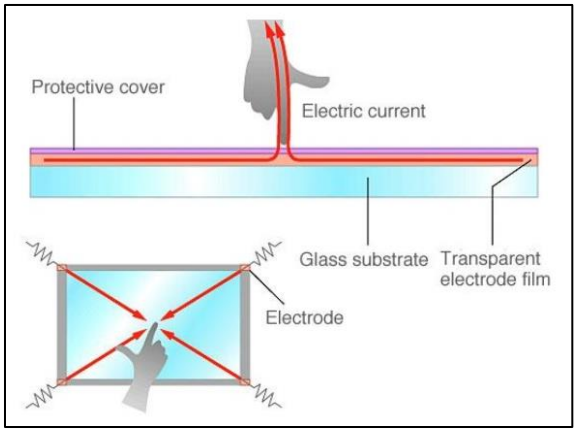


Figure 4: Capacitive Touch Screen Layout

Touch Screen Display Interactions

1. **View**
   The user views GUI items such as text, buttons, links, of forms on the display, which is interpreted as information.

2. **Think**
   After viewing information on the screen, the user thinks about which part of the GUI to interact with.

3. **Touch**
   Once the user is sure of which action to take, the screen is touched, and the touch screen displays receive this interaction as input.

4. **View**
   The input is converted to output, and the display presents new information.

Conclusion

In the business environment, touch screens are used to accomplish a multitude of tasks that can make business operations more efficient. Before business leaders implement this technology, it is important to understand its key components and variations. By having more knowledge of the components of resistive and capacitive touch screens specifically, business leaders can decide which variation, if any, may be useful for their business operations. Moreover, if touch screen displays need to be repaired, business leaders can make informed decisions about whether to repair or replace this part of an electronic device.

Considering that *resistive touch screens* can be touched by a larger variety of objects, this variation may be more useful for environments in which users are wearing gloves and only need to interact with on-screen buttons. *Capacitive touch screens*, on the other hand, can be used to accomplish more complex gestures like swiping, zooming, or scrolling but are only compatible with objects that can receive an electric charge. Each variation of touch screen displays has tradeoffs. Depending on the needs of the business and the devices' end users, the choice of a variation may be the difference between a regretful choice and a successful business decision.

Figures

Figure 1: Touch Screen Displays – Global Market Trajectory & Analytics
https://www.researchandmarkets.com/reports/4806452/touch-screen-displays-global-market-trajectory

Figure 2: Apple iPad

https://www.apple.com/ipad/

Figures 3 & 4: The 5 Types of Touch Screen Monitor Technology
https://tru-vumonitors.com/touch-screen-basics/

References

Graphical User Interface (GUI)

https://www.techopedia.com/definition/5435/graphical-user-interface-gui

How Does a Touch Screen Respond to Touch?

https://www.scienceabc.com/eyeopeners/touch-screen-respond-touch.html

Output Device

https://www.techopedia.com/definition/3538/output-device

Touchscreen

https://www.iop.org/explore-physics/technology-our-lives/touchscreen

How to Set Up a Java Development Environment on Mac

For Beginner Level Java Programming

By Forrest Moulin

Contents

1 Preparing for Development Environment Setup

Total estimated setup time: 30 minutes

Just as Microsoft Word can be used to write an essay, Java development environments allow programmers, developers, and software engineers to write Java source code to build computer applications. This document explains the process that beginner level programmers can follow to set up a Java development environment on Mac.

Setting up a basic Java development environment can take about 30 minutes. The actual amount of time may vary based on internet connection speed, the rate at which the instructions are followed, and the amount of customization used in the environment.

There are some required materials needed to install the two key components of a Java development environment on a Mac computer. After checking the required materials, use secure setup practices to download the software components, and finalize the Java development environment setup.

1.1 Required Materials Checklist

- ✓ **Mac computer using macOS 10.14 (Mojave) or later**: *macOS 12 (Monterey) preferred*
- ✓ **Personal workstation accessories**: *keyboard, mouse, or other accessories*
- ✓ **HD monitor or display**: *1024 x 768 resolution or higher*
- ✓ **Sufficient free space in hard drive storage**: *at least 4 GB*
- ✓ **Sufficient free space in random access memory (RAM):** *at least 2 out of 8 or more GB*
- ✓ **Reliable internet connection**: *at least 10 Mbps download speeds*
- ✓ **Web browser**: *Chrome, Edge, Firefox, or Safari*

NOTE: This setup process might vary depending on the operating system, chip type, and licensed software version. The provided visuals are specific to a 2020 M1 MacBook Pro running on *macOS Monterey Version 12.3.1*. M1 Mac computers use *Apple Silicon (AArch64)* chips, which may require different software versions than Mac computers with *Intel (x64)* chips.

1.2 Secure Setup Practices

Be aware of cyber threats

CAUTION: Only download software from web sites operated by trusted sources. If you are unsure of the legitimacy of a site, take time to evaluate its authenticity before downloading or installing any software.

The web sites provided in these instructions use *Hypertext Transfer Protocol Secure (HTTPS)*, an internet communication protocol that protects the integrity and confidentiality of web site users' data. URLs using https are typically more secure than those using only http because https encrypts data exchanged to and from the web site.

Example of a URL using https

Consider software licensing terms

Please review software licensing terms before installing and using software in personal, academic, or business settings. This instruction set is based on two types of licensed software that are free for use on Mac at the time of this publication.

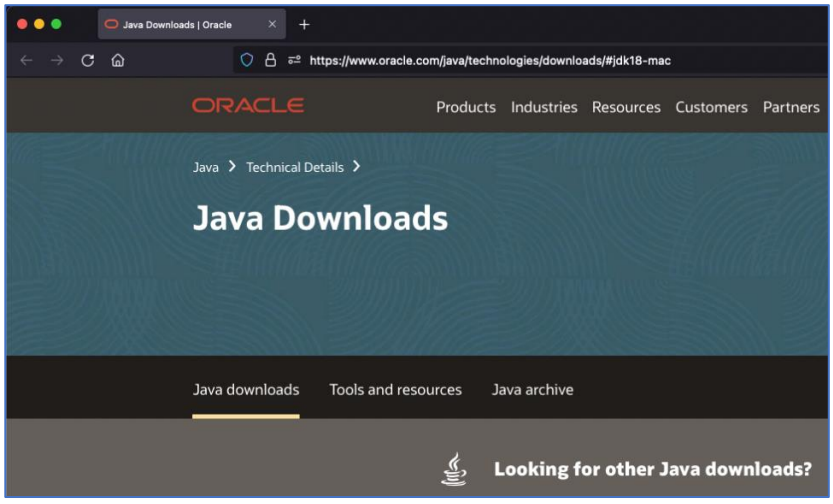
Software	Organization	Licensing Information URL
JDK 18	Oracle	https://www.oracle.com/downloads/licenses/no-fee-license.html
IntelliJ IDEA	JetBrains	https://www.jetbrains.com/legal/docs/company/useterms/

2 Setting Up the Java SE Development Kit (JDK)

The **Java Development Kit** is a group of directories and files that store the tools used for developing and running Java applications. There are multiple JDK versions and editions, including Enterprise Edition (EE), which is used for more advanced software development in enterprise settings. However, this document focuses on the **Standard Edition (SE)** of JDK version 18, available for personal and business programming use.

2.1 JDK Installation Steps

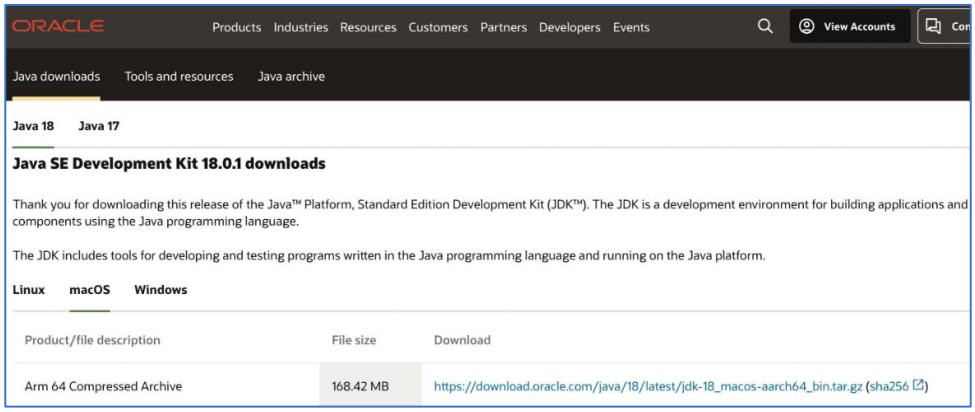
1. Use a web browser to open the Oracle *Java Downloads* page: https://www.oracle.com/java/technologies/downloads/#jdk18-mac



Java Downloads page

2. Beneath *Java 18* > *macOS*, Select the *Download* hyperlink for the **Arm 64 Compressed Archive**:

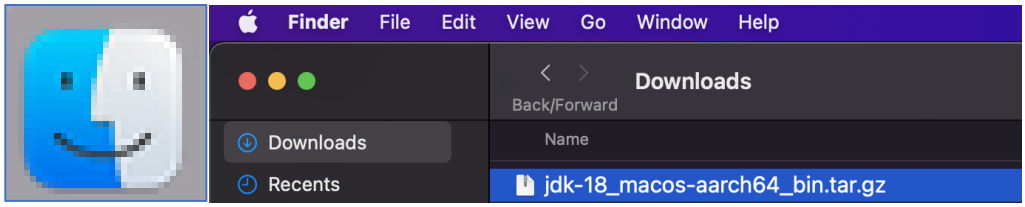
   https://download.oracle.com/java/18/latest/jdk-18_macos-aarch64_bin.tar.gz



Java SE Development Kit 18.0.1 downloads page

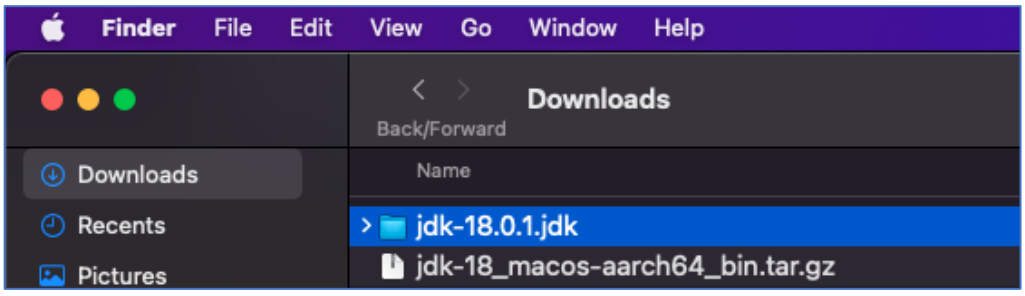
NOTE: Once the Download URL is selected, the JDK file should automatically download.

3. Wait for the file to download and use **Finder** to open the *Downloads* folder.



Compressed archive file in the Downloads folder

4. Double-click the **jdk-18_macos-aarch64_bin.tar.gz** file to unzip the compressed archive.



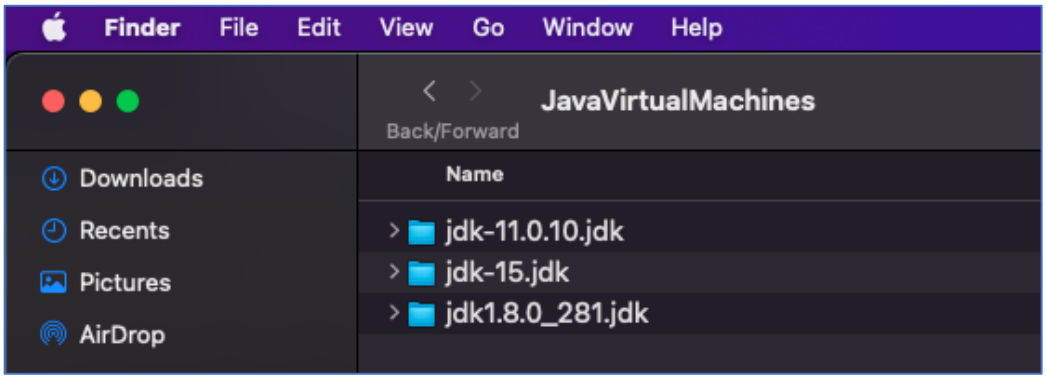
Unzipped compressed archive for JDK 18.0.1

*Notice how the **jdk-18.0.1.jdk** folder appears unzipped after the compressed archive is double-clicked.*

5. Copy the **jdk-18.0.1.jdk** folder so it can be moved from Downloads to the appropriate folder.

6. Use **Finder** to navigate to the **JavaVirtualMachines** folder:

   /Library/Java/JavaVirtualMachines

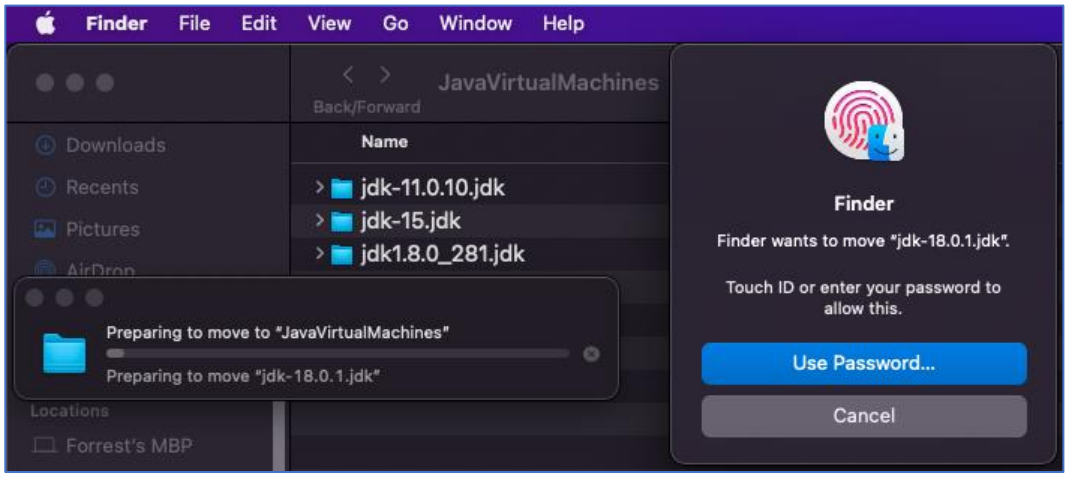


JavaVirtualMachines folder containing

Java SE Versions 11, 15, and 8

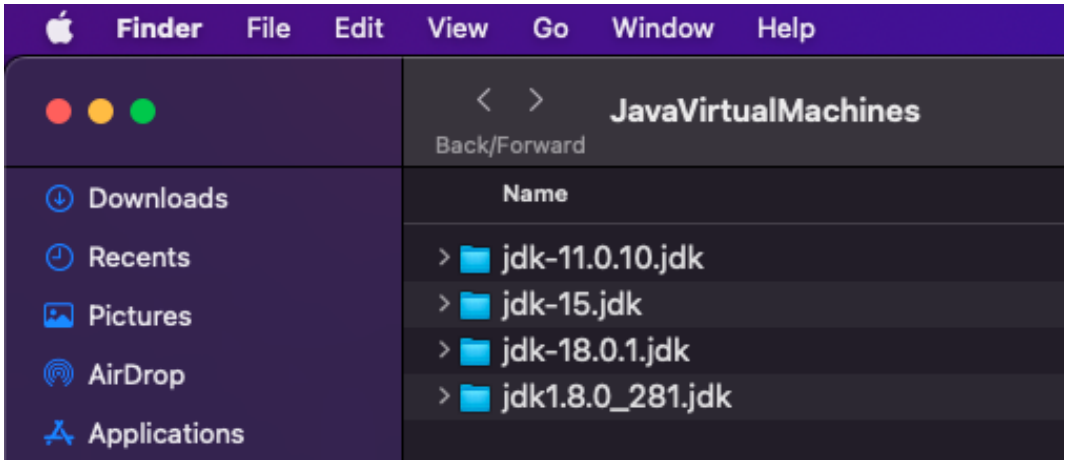
7. Right-click within the **JavaVirtualMachines** folder, hold down the option key, and select **Move Item Here** to cut and paste the JDK in the appropriate folder.

   NOTE: Finder may prompt you to use Touch ID or enter a password to make changes within the Library folder. Use a password or Touch ID as needed.



Touch ID/password prompt for user permissions

8. Verify that **jdk-18.0.1.jdk** was moved to the **JavaVirtualMachines** folder.



JavaVirtualMachines folder containingJava SE Versions 11, 15, 18, and 8

Once the JDK 18 folder is moved to the JavaVirtualMachines folder, the JDK installation is complete.

3 Installing the Integrated Development Environment (IDE)

3.1 Choosing an Integrated Development Environment

An integrated development environment is a program or application that provides a programmer with a graphical user interface to access JDK tools as well as create, edit, test, and debug applications. After installing the JDK, programmers can choose the IDE application they would like to use, such as Apache NetBeans, Visual Studio Code, or IntelliJ IDEA.

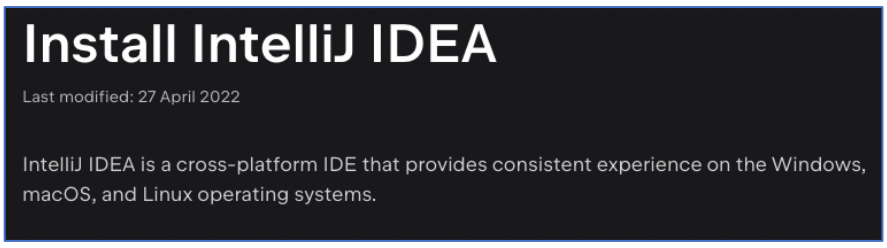
IntelliJ IDEA is an IDE made specifically for Java programming that is available on macOS, Windows, and Linux operating systems. There are two editions of this software:

- IntelliJ IDEA Ultimate (paid/free student access)
- Community Edition (free)

3.2 IDE Installation Steps

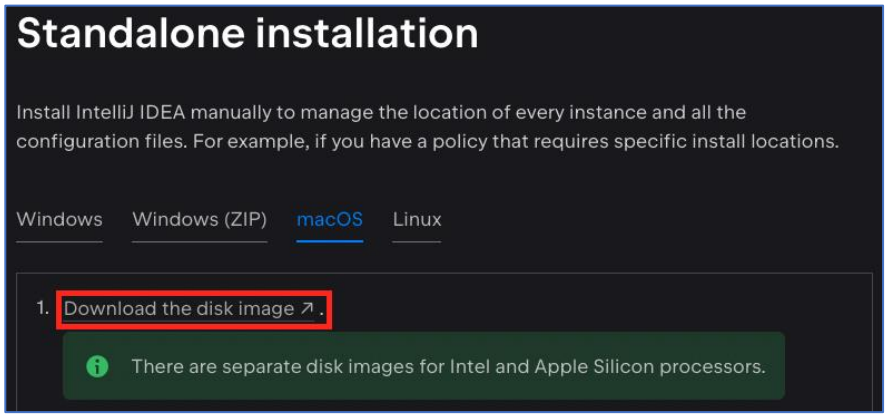
1. Use a web browser to navigate to the *Install IntelliJ IDEA* page:

   https://www.jetbrains.com/help/idea/installation-guide.html



Install IntelliJ IDEA page

2. Beneath *Standalone installation* select **macOS** > **Download the disk image**.



Standalone installation section for macOS

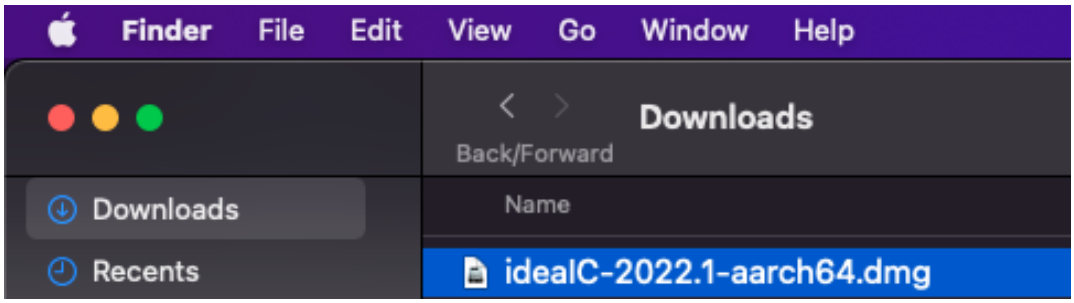
After the hyperlink is selected, a *Download IntelliJ IDEA* page will open.

3. Select **macOS** and choose the **.dmg (Apple Silicon)** option for the Community Edition.

Download IntelliJ IDEA page Community Edition selection

A thank you message will be displayed by JetBrains while the file downloads.

4. Use **Finder** to open the *Downloads* folder and double-click the downloaded disk image file.



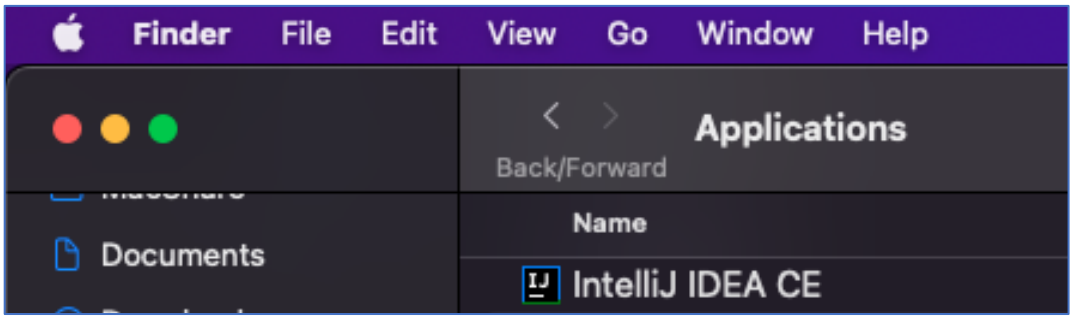
idealC-2022.1-aarch64.dmg file in the Downloads folder

NOTE: A window to drag the application will appear.

5. Drag **IntelliJ IDEA CE** to the **Applications** folder to move the IDE to the appropriate folder.

IntelliJ IDEA CE .dragTo window

6. Close the previous window and use *Finder* to open the **Applications** folder.



IntelliJ IDEA CE application in the Applications folder

Once the IntelliJ IDEA CE application is listed in the Applications folder, the IDE installation is complete.

4 Finishing Development Environment Setup

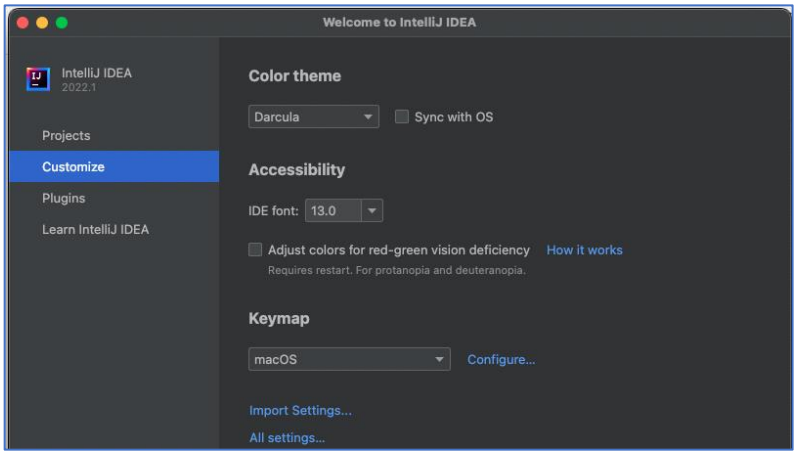
4.1 Personalizing Configurations

Once the JDK and IDE are installed, users can personalize their development environment through the IDEs graphical user interface.

1. Use **Finder** to open **IntelliJ IDEA CE** from the *Applications* folder, and select **Open** when asked if you want to open it.

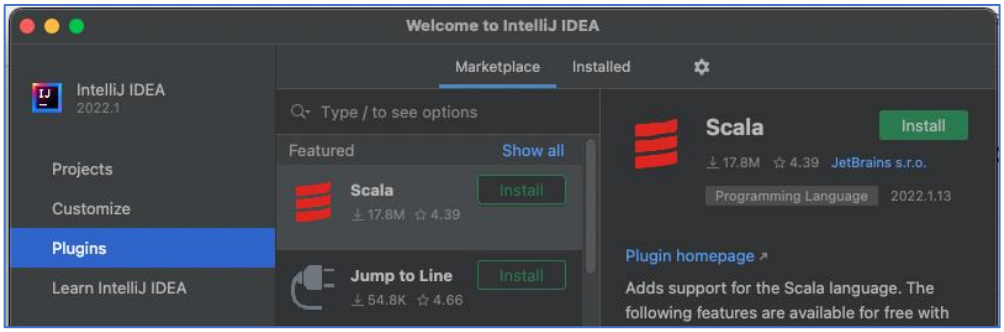
Opening IntelliJ IDEA CE for the first time

2. After the IDE opens, select **Customize** to view *Color theme*, *Accessibility*, *Keymap*, and other settings.



IntelliJ IDEA CE *Customize* menu

3. Select **Plugins** to view available plugins.



IntelliJ IDEA CE *Plugins* menu

4. Explore the resources in **Learn IntelliJ IDEA** to familiarize yourself with the software.

Learn IntelliJ IDEA menu

Congratulations, you have installed a JDK and an IDE to begin Java programming! Other JDK versions can be installed, and you can also install other IDEs in the future.

5 References

Find out which macOS your Mac is using

https://support.apple.com/en-us/HT201260

Installation of the JDK on macOS

https://docs.oracle.com/en/java/javase/18/install/installation-jdk-macos.html#GUID-2FE451B0-9572-4E38-A1A5-568B77B146DE

Install IntelliJ IDEA

https://www.jetbrains.com/help/idea/installation-guide.html

IntelliJ IDEA overview

https://www.jetbrains.com/help/idea/discover-intellij-idea.html

Java SE Development Kit 18.0.1 downloads

https://www.oracle.com/java/technologies/downloads/#jdk18-mac

Java SE Documentation

https://www.oracle.com/java/technologies/javase-documentation.html

Java™ Platform Standard Edition 18 Development Kit

https://www.oracle.com/java/technologies/javase/jdk18-readme-downloads.html

JDK 18 Documentation

https://docs.oracle.com/en/java/javase/18/

Licensing Information User Manual

https://www.oracle.com/a/tech/docs/jdk8-lium.pdf

Oracle No-Fee Terms and Conditions (NFTC)

https://www.oracle.com/downloads/licenses/no-fee-license.html

What Is a Development Environment? (With Examples)

https://www.indeed.com/career-advice/career-development/development-environment

What is integrated development environment (IDE)?

https://www.w3schools.in/integrated-development-environment-ide

What is IntelliJ IDEA?

https://www.jetbrains.com/idea/features/

Windows 10 Technical Documentation (Instruction Sets)
By Forrest Moulin

Table of Contents

Include Seconds in Taskbar Clock (Long Time)

Have you ever felt like you had an entire minute to complete a task only to see the minute on the clock change just a few seconds later?

Windows 10 does not currently allow users to continuously display seconds on the taskbar clock via the Settings menu. However, a change can be made to the Windows Registry to display the time on the taskbar in long time format (***00:00:00***). Such a change allows users to be aware of the seconds on the clock and maximize each minute, empowering them to accomplish tasks, attend meetings, and view metrics more effectively!

CAUTION: Making changes to the Windows Registry with the Registry Editor can have negative consequences for the Windows 10 operating system if these steps are not followed exactly. Please be careful when navigating through the Registry Editor, and do not edit anything you are unfamiliar with. Consult with your computer administrator before making modifications to the user profile.

Create a Restore Point (recommended)

Before making changes to the Windows Registry, backup the operating system settings by creating a system restore point.

1. Press the **Windows logo key**, type **Create a restore point**, and select it from the results.
2. On the **System Protection** tab in **System Properties**, select **Create…**.
3. Type a description for the restore point, and then select **Create** > **OK**.

   Create a system restore point:
   https://support.microsoft.com/en-us/windows/create-a-system-restore-point-77e02e2a-3298c869-9974-ef5658ea3be9

Restore from a Restore Point (as needed)

Press the **Windows logo key**, type **Create a restore point**, and select it from the results.

1. Select **System Restore**.

How to back up and restore the registry in Windows:
https://support.microsoft.com/en-us/help/322756/how-to-back-up-and-restore-the-registryin-windows

Edit the Windows Registry

1. *Registry Editor*
    - Press the **Windows logo key** and enter **regedit** to open the Registry Editor.
2. *Navigate to the Advanced Folder*
    - Carefully navigate to the following folder (key) path by selecting each folder until you reach Advanced:

      Computer\HKEY_CURRENT_USER\Software\Microsoft\Windows\ CurrentVersion\Explorer\Advanced
3. *Add New DWORD Value*
    - Right-click on the **Advanced** folder > Select **New** > Select **DWORD (32-bit) Value**.
4. *Name the DWORD Value*
    - Name the new DWORD Value **ShowSecondsInSystemClock**.
    - If you accidentally name it something else, right-click the name, select **Rename**, and enter the correct name.
5. *Edit DWORD Value Data - Turn seconds on*
    - Double click the **ShowSecondsInSystemClock** DWORD Value, type 1 in the **Value data** field, and select **Ok**.
    - Restart your computer, and your changes are complete. Now you can watch all 28,800 seconds tick away during an 8-hour shift!
6. *Delete DWORD Value Data - Turn seconds off (Optional)*
    - Double click the **ShowSecondsInSystemClock** DWORD Value, type 0 in the **Value data** field, and select **Ok**.
    - If you would like to remove this setting altogether, right-click the **ShowSecondsInSystemClock** DWORD Value, and select **Delete**.
    - Restart your computer, and your changes are complete!

Windows 10 Key Terms

- **DWORD Value**: 32-bit unsigned integer ranging from 0 to 4294967295. In this case, the value is set to 0 for off and 1 for on.
- **Registry Editor**: desktop application used to view and modify the Windows Registry.
- **Windows Registry**: a local database that contains information that Windows continually uses during operation, including user profiles.

Windows 10 Clipboard History (Copy 25 Items)

How many times have you needed to copy and paste multiple items between more than one application window? Maybe you accidentally copied a second item and thought that you lost an important item that you had previously copied? Moving back and forth to copy and paste items can be meticulous, but Windows 10 includes a useful feature, which allows users to copy up to 25 items at once!

By utilizing the Windows 10 clipboard history feature when copying data (4 MB/item: text, HTML, or Bitmap), users change windows just once every 25 items instead of changing windows multiple times from the initial data source.

Windows 10 Clipboard Shortcuts

NOTE: Once enabled, clipboard history saves up to 25 items to the clipboard.

1. Enable/Disable clipboard history

- Press the **Windows logo key** + **V**, or navigate to **Settings** > **System** > **Clipboard.**
- Turn clipboard history **On**/**Off**.

2. Copy up to 25 items

- The Clipboard will display the most recent items first. Older items will be removed unless pinned.
- If you would like to view the items in a specific order on the clipboard, copy them in reverse.

3. Paste up to 25 items

- Press the **Windows logo key** + **V** simultaneously
- Use the mouse, up/down arrow keys, or the scroll bar to select the item to copy.
- Press **Ctrl** + **V** to paste items as needed.

4. Pin/Unpin items to/from clipboard

- With the clipboard menu open, select **...** to the right of the item.
- Select **Pin**/**Unpin**.

5. Delete items from clipboard

- With the clipboard menu open, select **...** to the right of the item.
- Select **Delete**.
- (Optional): Select **Clear all** to remove all items from the clipboard.

Windows 10 Clipboard Menu Example

This is pretty awesome!
Don't forget to **Delete** a clipboard item once you are done using it.

References

Clipboard on Windows: https://support.microsoft.com/en-us/windows/clipboard-in-windows-c436501e-985d-1c8d-97ea-fe46ddf338c6

DWORD information: https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-dtyp/262627d8-34184627-9218-4ffe110850b2

Get Help with Clipboard: https://support.microsoft.com/en-us/windows/get-help-with-clipboard-30375039-ce71-9fe45b30-21b7aab6b13f#ID0EBBD=Windows_10

How to open Registry Editor in Windows 10: https://support.microsoft.com/en-us/windows/how-to-open-registry-editor-in-windows-10deab38e6-91d6-e0aa-4b7c-8878d9e07b11

Keyboard shortcuts in Windows: https://support.microsoft.com/en-us/windows/keyboard-shortcuts-in-windows-dcc61a57-8ff0cffe-9796-cb9706c75eec

Registry Value Types:

https://docs.microsoft.com/en-us/windows/win32/sysinfo/registry-value-types

Windows registry information for advanced users: https://docs.microsoft.com/en-us/troubleshoot/windows-server/performance/windowsregistry-advanced-users

Software Development Resource Guide

For Early Career Software Developers

By Forrest Moulin

Table of Contents

(Select a topic to navigate)

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About This Guide

Contents

This guide provides information about secondary research software development resources, including internet sites, a government publication, a digital library index, and a periodical journal. Primarily, the resources offer useful information for software development topics such as collaboration methods, data types, programming language guidance, software design methodologies, and usability.

These resources and tools provide information to address specific challenges and explore future issues in the development industry. While there are some software engineering principles contained within the guide, it mostly contains information relating to high-level software and application development.

Audience

The guide was created for software development students and professionals to sharpen their knowledge at the early stages of their careers. For example, the contents of this guide may be useful to junior or senior undergraduate students studying programs related to information technology, software design, or information systems.

This guide could also be helpful for baccalaureate graduates as well as undergraduates in their first two years of a related technological study. Dedicated software professionals may already have extension knowledge of these topics, but they might have some use for these resources.

Assumptions

Those who are utilizing the Software Development Guide will typically have coding skills in one or more programming languages (Java, Python, C#, etc.). Although taking software development courses is not a prerequisite for understanding the contents of this guide, it would help to have developed basic software applications in an individual or collaborative setting.

For those who have very little knowledge of software development, it may be of use to first research and understand the definitions of certain concepts such as frameworks, methodologies, human-centered design processes, and software development environments.

Select to view the Table of Contents

Purpose

The purpose of the guide is to empower early in career software developers to expand their knowledge base, discover techniques for addressing development issues, and utilize credible resources to reference information as needed. There are multiple conditions under which someone might use this guide. In general, its contents can be used to gain knowledge of the software design process, address application errors, ask other developers questions, or create repositories to showcase software projects.

Organization

The Software Development Guide is divided into key software development topics separated by resource type. The internet sites section discusses the following resources: a data dictionary, a git repository service, a Java database guide, and usability practices information. Following the internet sites is a section that contains three publication resources: a government document on mobile software development, an engineering digital library index, and a periodical journal for software development processes.

The content of both sections is listed in alphabetical order. Any heading can be accessed by selecting its title in the table of contents, and each page contains a link to return to the table of contents. Page numbers are also placed at the top right corner of each page.

Usage Tips

Below are some recommended tips to effectively utilize this guide:

- Use the find function (Ctrl + F/Cmd + F) to search the guide for specific text
- Select the title of a heading in the table of contents to quickly navigate to a section
- Use the hyperlink to access the URL of the provided resources
- Explore the provided resources and create favorites/bookmarks in a web browser
- After studying the provided resources, use a search engine to find similar material
- Read aloud the text of this guide with a PDF viewer or similar software

Internet Resources

Dictionary of Algorithms and Data Structures
https://xlinux.nist.gov/dads/

Abstract

The Software and Systems Division of the National Institute of Standards and Technology (NIST) provides a dictionary of algorithms and data structures commonly used in computing and software development. While the site was originally created in 1998, it still contains relevant computing information as of the publication date of this guide. At times developers may not recall every data type or algorithm on their own, so it can be useful to see an alphabetical list of common development items. Additionally, new dictionary entries have been added, and information has been updated by the NIST as needed. The items listed in the dictionary are essential building blocks to creating software and using it to solve real-world problems. Each item contains a link to a page with the item's definition, pronunciation, and implementation. By referencing this site, developers can find a variety of topics and make use of established development techniques and tools. Some examples of the information listed in the dictionary are Boolean functions, hash trees, the merge sort algorithm, and queues. Users can utilize a built-in search function to find specific information, which can be helpful when they need to utilize an item that might not be used every day.

Overview

- Free alphabetical list of common data types and algorithms
- Definitions of relevant software development building blocks
- Hyperlinks to navigate to specific pages
- Internet and site search function embedded
- Real-world implementation examples
- Both modern and archived information provided

GitHub

https://github.com/

Abstract

GitHub, Inc. is a private company that offers both free and paid services for developers to create software repositories, collaborate on projects virtually, automate development workflows, and search for guidance from the developer community. The site contains documentation and learning labs that help developers understand how to use the open-source version control software called Git. Developers can search the site to view the work of others, share software projects, and use open-source software examples to help solve development issues. There are a variety of courses that can be saved and completed with a free account, covering topics like DevOps, Git, programming languages, and how to utilize the sites features. GitHub also provides information for developers to interface an online repository with an integrated development environment (IDE) such as Visual Studio or Apache NetBeans. From early in career software students, to small teams, to enterprises, GitHub is a powerful resource for developing software and learning modern development techniques.

Overview

- Software project repository and collaboration channel
- Access to version control software and documentation
- Community forums to connect and learn about current events
- Free training material on development topics
- Integration with IDEs for seamless project updates

Oracle® Database Java Developer's Guide

https://docs.oracle.com/en/database/oracle/oracle-database/12.2/jjdev/java-developers-guide.pdf

Abstract

The Oracle Database Java Developer's Guide (12c Release, 2017) contains over 300 pages of technical information regarding the use of Oracle's relational database management system (RDBMS). Developers with knowledge of the Java programming language and database programming languages like SQL can use this guide as a reference for integrating Java applications and Oracle Database. The site is essentially a PDF file with a table of contents, so it can be accessed via the internet, printed, or downloaded as needed. Those without Java or database experience may find this guide to be complex and difficult to understand. It covers a wide array of topics, including classes, the JVM, front-end development tools, and database security. To navigate the resource effectively, users can select hyperlinks from the table of contents within the document or use a search function to find specific text. Although the guide is targeted for developers using specific software and languages, it can be helpful for others who want to expand their knowledge of the Java programming language and full-stack development.

Overview

- Oracle Database RDBMS topics and information about tools
- Java class references and implementation examples
- Details for using SQL and JavaScript in combination with Java
- Information specific to Oracle Database security and web services
- Accessible for free online, printed, or via PDF

User Experience Basics

https://www.usability.gov/what-and-why/user-experience.html

Abstract

The usability.gov site is hosted by the U.S. General Services Administration's Technology Transformation Services. "User Experience Basics" is a page within the site that discusses strategies and tools for developers to incorporate human-centered design principles in their software. The site is simple yet powerful because understanding user identities, needs, abilities, and limitations helps developers to create effective and inclusive software. There are links to related resources, categories, and content on the page as well as definitions of related disciplines such as accessibility, project management, user interface (UI) design, and web analytics. Early in career software developers can benefit from understanding the foundations of the user experience and related processes, but the content in this site can also assist experienced, technical developers relate to less technical end users. Furthermore, usability.gov site offer human-computer interaction (HCI) methods, templates, and documents that can be used in projects and usability tests.

Overview

- Free guidance on user interfaces, user experiences, and usability
- Links to related resources like HCI methods, accessibility, and design
- Foundational knowledge of project management and software development process
- Managed by U.S. government's Technology Transformation Services
- Site search feature, RSS feeds, and usability tools provided

Publication Resources

Catalog of U.S. Government Publications
https://catalog.gpo.gov/

Abstract

This site is a search tool that contains electronic and printed documents from the National Bibliography of U.S. Government Publications. The publications are made by the executive, legislative, and judicial branches of the federal government, dating as far back as the late 1800s. The Catalog of U.S. Government Publications contains documents ranging from historical records to contemporary research publications. Therefore, this catalog is useful for not just software development content but also a large variety of information. Users can conduct a basic search or an advanced search, in which keywords, years, languages, or specific catalogs are entered. While using the site, a user can create a temporary "Bookshelf" where content can be temporarily saved during a single session. Developers might use this site to find research publications or legislative documents relating to emerging methodologies the software development field, such as the National Institute of Standards and Technology (NIST) publication below:

Initiating Mobile Software Development - Lessons Learned From A 12 Month Project
https://www.govinfo.gov/content/pkg/GOVPUB-C13-bd0b4e01f08b0599109fee0775420976/pdf/GOVPUB-C13-bd0b4e01f08b0599109fee0775420976.pdf

The above publication from 2011 discusses ideas from a year-long NIST mobile software development project. While most software development is completed on a computer, many software applications and products are made for mobile devices. The publication primarily discusses strategies and techniques like graphical user interface (GUI) design, library usage, design testing, and workflow processes for mobile software.

Overview

- Free access to centuries of U.S. government publications
- Relevant software development research published by the NIST and other agencies
- Basic or advanced search features to filter results
- Ability to save content with "Bookshelf" during research sessions
- Certain publications provided in languages other than English

IEEE Xplore® Digital Library Index

https://ieeexplore.ieee.org/xplore/home.jsp

Abstract

Institute of Electrical and Electronics Engineers' (IEEE) *Xplore* is a digital library index created for the discovery of both technical and scientific material. The index contains IEEE publications as well as publications by its partners. At the time of this guide's publication, IEEE Xplore offers access to over 295 journals, 4 million conference papers, and 6,000 books. Therefore, software developers can expand their knowledge of emerging technological subjects by accessing material specific to their field or exploring related fields such as engineering or computer science. For example, to find specific information about emerging engineering technologies that might affect software design processes, developers can browse by category or conduct advanced searches. Users can also save favorite content to their account or request email alerts when new issues of journals or magazines are released. A paid personal or organizational subscription is required to access the site, so *Xplore* would not be useful for someone searching for a free resource. However, many schools and private organizations subscribe to the journal, so it is recommended that potential users check with their organization to find out whether they might already have access.

Overview

- Personal or organizational paid subscription for access
- Engineering and technology information from hundreds of journals
- Advanced and customizable search functions
- Content can be saved to an account or custom notifications can be created
- Current engineering information that relates to software development methods

Journal of Software: Evolution and Process
https://onlinelibrary.wiley.com/loi/20477481

Abstract

The company John Wiley and Sons, Inc. is a publisher of academic materials such as the *Journal of Software: Evolution and Process*. This periodical journal publishes papers and research that discuss topics such as the design, development, implementation, maintenance, and capabilities of software and related systems. Software developers can utilize the journal to find current and archived information that address development processes, modifications to software systems, and strategies for building software with emerging technologies. As of the year 2022, there are 34 volumes that contain up to 12 issues each. Volumes are associated with a specific year and are indexed in chronological order. Developers can read the journal or subscribe to Really Simple Syndication (RSS) feeds to stay current on relevant software and information systems topics. For example, a developer could read a volume to discover changes to development standards, semantics, or methodologies that could improve their ability to innovate and collaborate in the industry. The journal does require a paid subscription, but it is recommended that users check with their educational institution or employer to verify whether they might already have access.

Below is an article from this journal that discusses the use of a hybrid software development approach. It discusses how utilizing a mix of agile and plan-based development processes is becoming more common and effective than a single development method:

Goals and challenges in hybrid software development
https://doi.org/10.1002/smr.2382

Overview:

- Paid subscription required by John Wiley and Sons, Inc.
- Hundreds of issues relevant to software development methods and technologies
- Emerging information systems guidance and research articles
- Option to subscribe to RSS feeds to receive information updates
- Details on software development semantics, standards, and methodologies