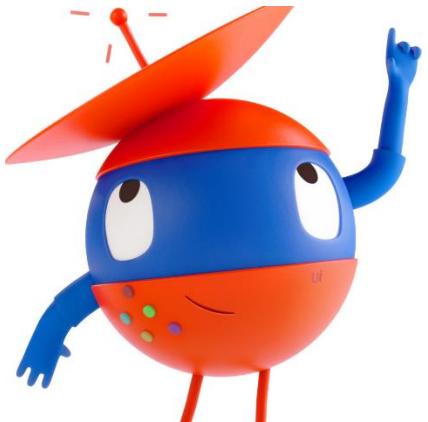
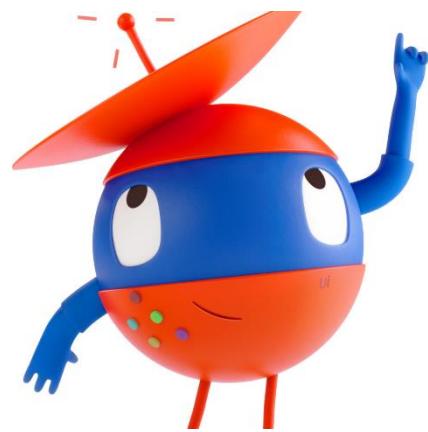


Automation Design and Development

Subject Code: AIE632(3:0:0)



Presentation By,
Dr. Ganeshayya Shidaganti,
Associate Professor, Department of CSE
Ramaiah Institute of Technology





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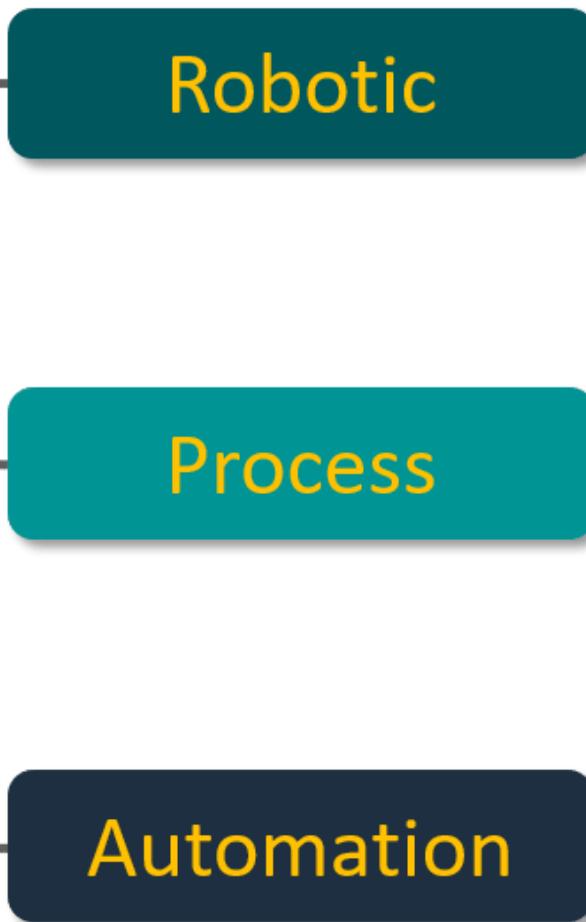
UiPath is a global software company for robotic process automation founded in Romania by Daniel Dines and Marius Tîrcă and headquartered in New York City. [Wikipedia](#)

Revenue: 60.76 crores USD

Founded: 2005, Bucharest, Romania

Headquarters: New York, New York, United States

Number of employees: 3 000



An entity which has the capability to **mimic the human actions**.

A **sequence of steps**, that lead to a meaningful activity or task is known as a process.

Tasks happens automatically, i.e. **without human intervention**.

Why should you care?

The need for upskilling in the age of automation

From a business perspective, upskilling essentially concerns itself with “improving the skills of employees, so that they will be faster and better at their jobs”.

Future of jobs with robotic process automation

While industrial automation will impact the blue-collar workers, white-collar workers will face the results of increased use of RPA

JOB MARKET FORECAST

2030 —
jobs that have
the potential for automation
1.2 B impacted jobs

58 million net new jobs in the next five years – World Economic Forum

6,972 views | May 1, 2018, 09:00am
AI Doesn't Eliminate Jobs, It Creates Them
Michael Xie CommunityVoice
Forbes Technology Council CommunityVoice

AI will create new jobs but skills must shift, say tech giants

Natasha Lomas @riptari / 7 months ago



Automation replaced 800,000 workers... then created 3.5 million new jobs

Automation Is Expected to Create Jobs but Only You Can Make Sure You Get One

Prepare now to join the digital workforce before the arrival of the robotic overlords.

Robotic Process Automation will generate nearly two lakh jobs in India by 2021

What Can Software Robots Do?



Log in to any application



Move files and folders



Read and write to databases



Scrape data from the web



Connect to system APIs



Extract content from documents, PDFs, emails and forms



Open emails and attachments



Make calculations



RPA has already been implemented in some business areas to perform repetitive and time-consuming tasks.

HR Services



Example processes:

- Recruitment
- Payroll
- Personnel Administration

Finance and Accounting



Example processes:

- Procurement to Pay
- Order to Cash
- Vendor Management

IT Services



Example processes:

- Password reset
- Account unlock
- Chatbot integration

Supply Chain



Example processes:

- Inventory Management
- Invoice / Contract Management
- Work Order Management



Business Process
Outsourcing



Finance & Banking



Insurance



Healthcare



Telecom



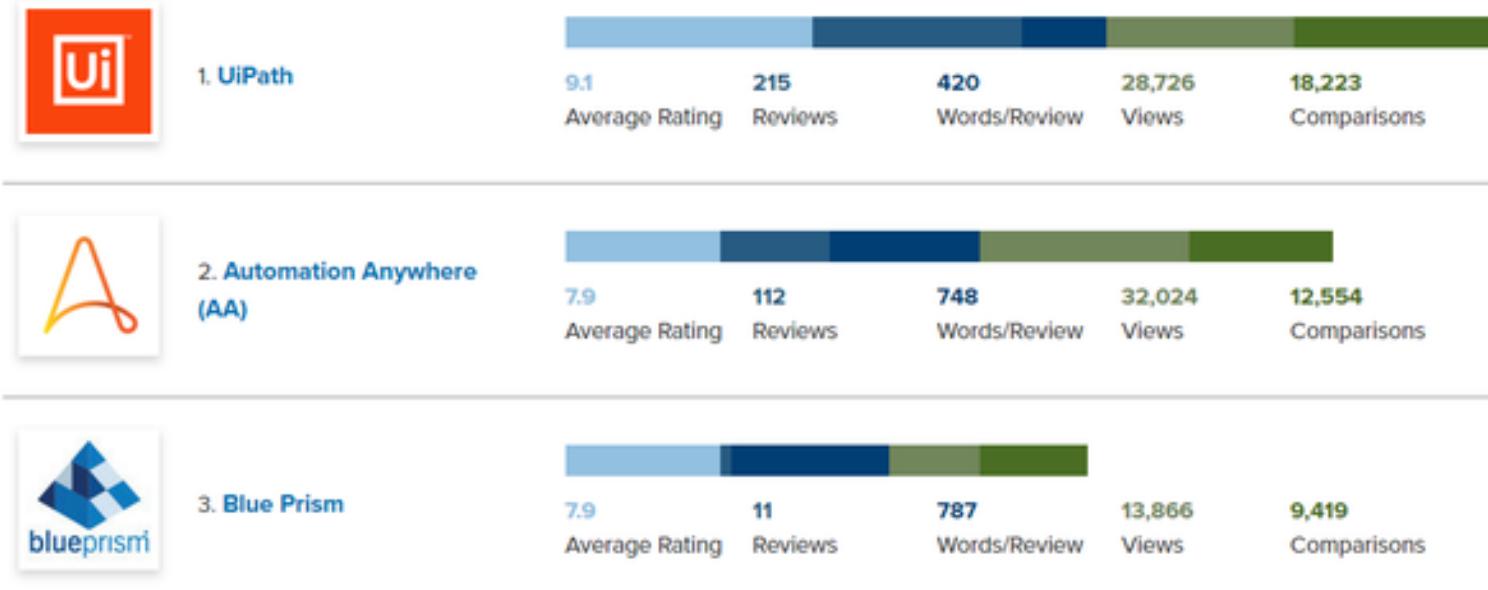
Manufacturing



Public Sector



Retail & Consumer
Packaged Goods



Prerequisites: What technical setup do I need?

1

UiPath Automation Cloud account

You will need the account to be able to:

- install Studio, Assistant and Robot.
- distribute attended and unattended licenses.
- provision robots and run jobs.

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Register here if you don't have an account already
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Get Started with RPA Development

Navigate the end to end experience of setting up,
building and running our first automation in attended mode

- Get access to UiPath Automation Cloud
- Download the installer
- Sign in directly in Studio
- Build a Hello World project
- Publish it to Orchestrator
- Run it from UiPath Assistant

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Your Learning Journey

1

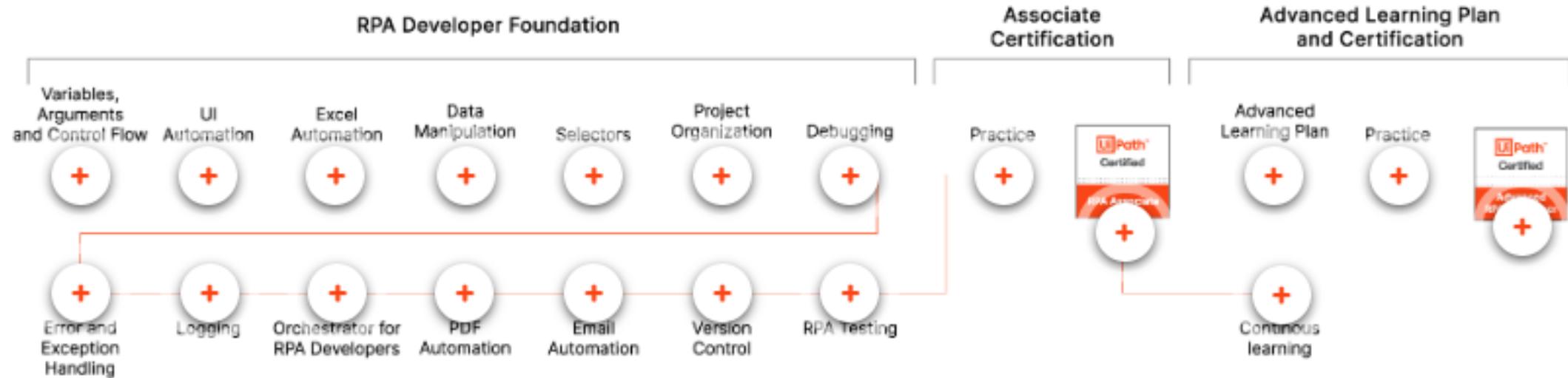
Become an Associate RPA Developer - This stage means you are able to create effective processes or workflows to be integrated in larger projects by senior RPA Developers. To reach this stage, you can complete the RPA Developer Foundation learning plan, work on a few projects then pass the Associate Certification exam.

2

Become an Advanced RPA Developer - This stage means that you are able to create complex projects on your own using the Robotic Enterprise Framework. To reach this stage, you can complete the Advanced Learning Plan, implement a few projects then take the Advanced RPA Developer exam.

3

Become an Expert RPA Developer - There are several areas of specialization you can explore in this stage. Among them: Attended Automation, AI Center, Document Understanding, Data Service, Orchestration Process and Action Center, Test Automation.



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RPA Starter

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87682 enrolled students

In progress

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RPA Starter	
 Port	Introduction to RPA and Automation REQUIRED
1 Modules	1h
 Port	
Build Your First Automation with StudioX REQUIRED	
1 Modules	2h 30m

RPA Starter

3h 30m

Diploma of Completion included

RESUME LEARNING PLAN

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Complete the Learning Plan to unlock

← → C academy.uipath.com/learning-plans/automation-developer-associate-training  

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All Learning Plans > Automation Developer Associate Training

LEARNING PLANS

Automation Developer Associate Training



If you want to contribute to building a better business world through developing enterprise automation projects, the UiPath Automation Developer Associate Training plan is for you!

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Learning Plan details

 **LANGUAGE**
English

 **COMPLETION TIME**
43h 35m

Automation Developer Associate Training

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The screenshot shows the 'Learning Plans' section of the UiPath Academy website. At the top, there's a search bar with a magnifying glass icon and a 'Reset' button. Below it, a navigation bar includes links for HOME, COURSES, LEARNING PLANS, CAREER PATHS, CERTIFICATION, RESOURCES, and CONTACT, along with a 'Login/Sign Up' button. The main content area displays 19 results for 'Automation Business Analyst Training', 'Automation Infrastructure Engineer Professional with Windows Training', 'Automation Solution Architect Training', and 'Test Automation Engineer Training'. Each result card includes a thumbnail, the course name, the number of courses (e.g., 22 Courses), and the total duration (e.g., 35h 30m). A dropdown arrow icon is located next to each result card.

https://academy.uipath.com/courses

The screenshot shows the 'Courses' section of the UiPath Academy website. At the top, there's a search bar with a magnifying glass icon and a 'Reset' button. Below it, a navigation bar includes links for HOME, COURSES, LEARNING PLANS, CAREER PATHS, CERTIFICATION, RESOURCES, and CONTACT, along with a 'Login/Sign Up' button. The main content area displays 175 results for various courses. On the left, there's a sidebar with a 'Product' dropdown menu containing categories like Action Center, Activities, AI Center, Apps, Assistant, Automation Cloud, Automation Hub, Automation Ops, and Automation Suite. The main area shows cards for 'Get started with enterprise automation', 'Selectors Overview for Business Analysts', 'UiPath AI Center Overview for Business Analysts', 'UiPath Process Mining Application Customization', 'UiPath Platform', 'UiPath Automation Suite', 'UiPath Studio', and 'UiPath'. Each card includes a thumbnail, the course name, and the duration (e.g., 1h 20m, 25m, 50m, 3h 30m).

Courses: Get Started with RPA Development (v2020.10)

UiPath Studio

<https://www.uipath.com/product/studio>

- UiPath Studio is an integrated development environment for **RPA developers to design, develop, and debug automation projects.**



What it does?

It allows RPA developers to create workflows, with API integrations to an ever-growing list of applications, technologies, and platforms. More complex automations are easily handled with basic coding knowledge.]

Users

RPA Developer, Business Decision Maker, Business User

Example

Developing an automation that tracks licenses assigned to a team and allocates or removes them based on usage.

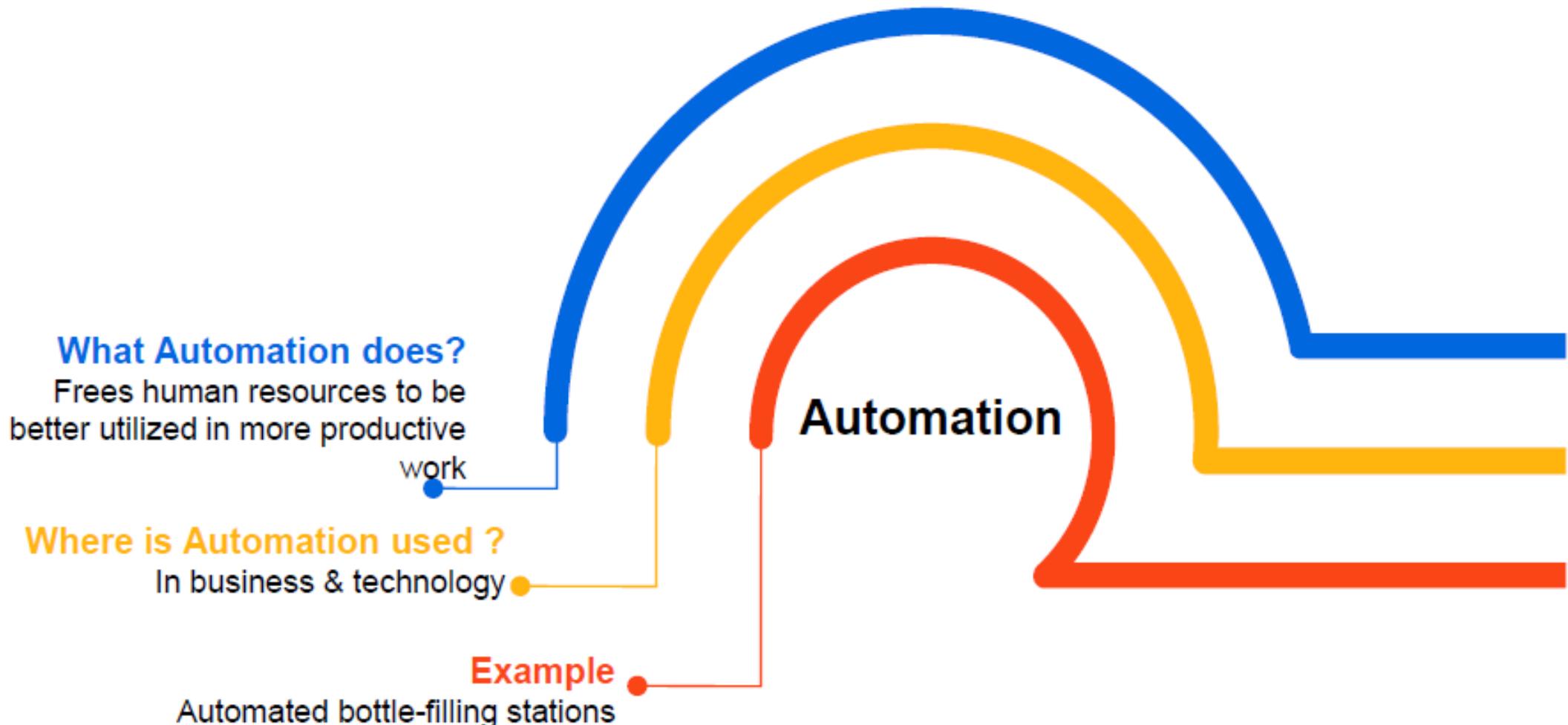
INTRODUCTION TO ROBOTIC PROCESS AUTOMATION (RPA):

- Scope and Techniques of Automation,
- Benefits of RPA,
- Core components of RPA (Studio, Orchestrator and Robot with Assistant),
- RPA Platforms,
- UiPath Stack,
- Two types of UiPath Robots - Attended and Unattended,
- Downloading and Installing UiPath Studio,
- Learning UiPath Studio.

AUTOMATION AND RPA:

- History of Automation,
- Automation and Its benefits,
- Automation vs RPA,
- Process and Flowchart,
- RPA Programming Constructs,
- Benefits and Implementation of RPA,
- RPA Development Life Cycle,
- How does RPA Work,
- Challenges in RPA.

Introduction to Automation



Introduction to Automation

Automation is the technology by which a process or procedure is performed with minimal human assistance.

- Operating equipment such as machinery, processes in factories, boilers.
- Switching on telephone networks, steering and stabilization of ships, aircraft

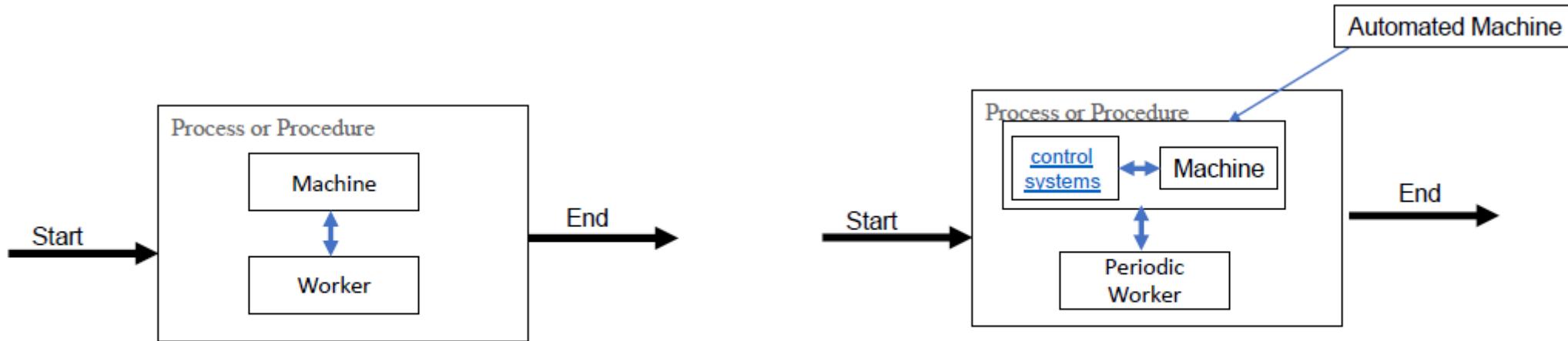
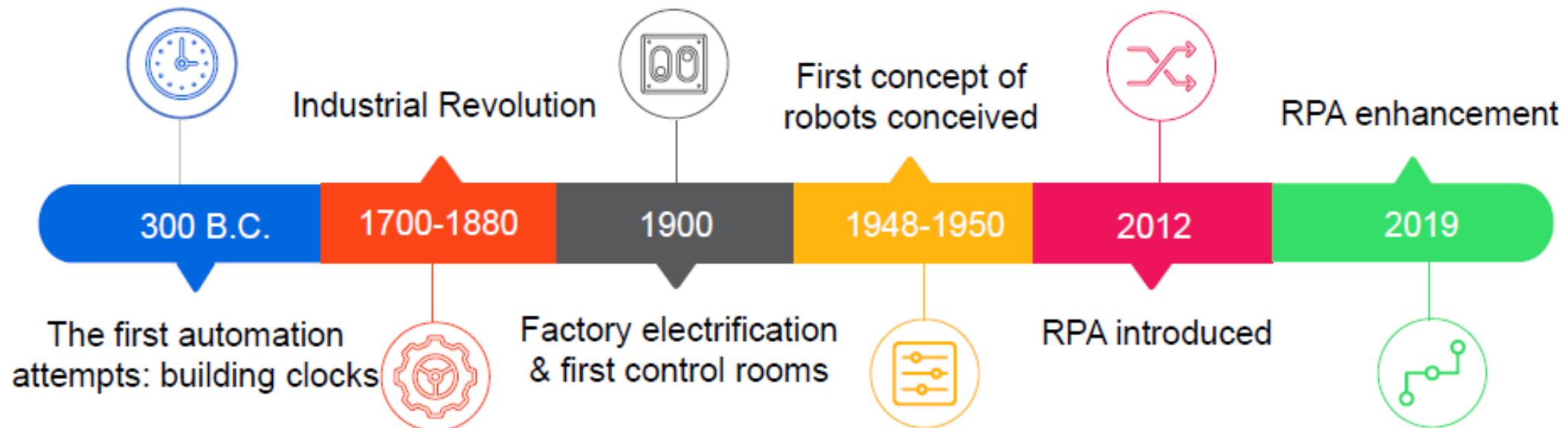


Fig: 1.a General execution of process

Fig: 1.b Execution of process using Automation

Overview of History of Automation

The history of automation began more than 2300 years ago.



Introduction to RPA

RPA stands for Robotic Process Automation

RPA refers to software robots programmed to replicate the actions of human operator

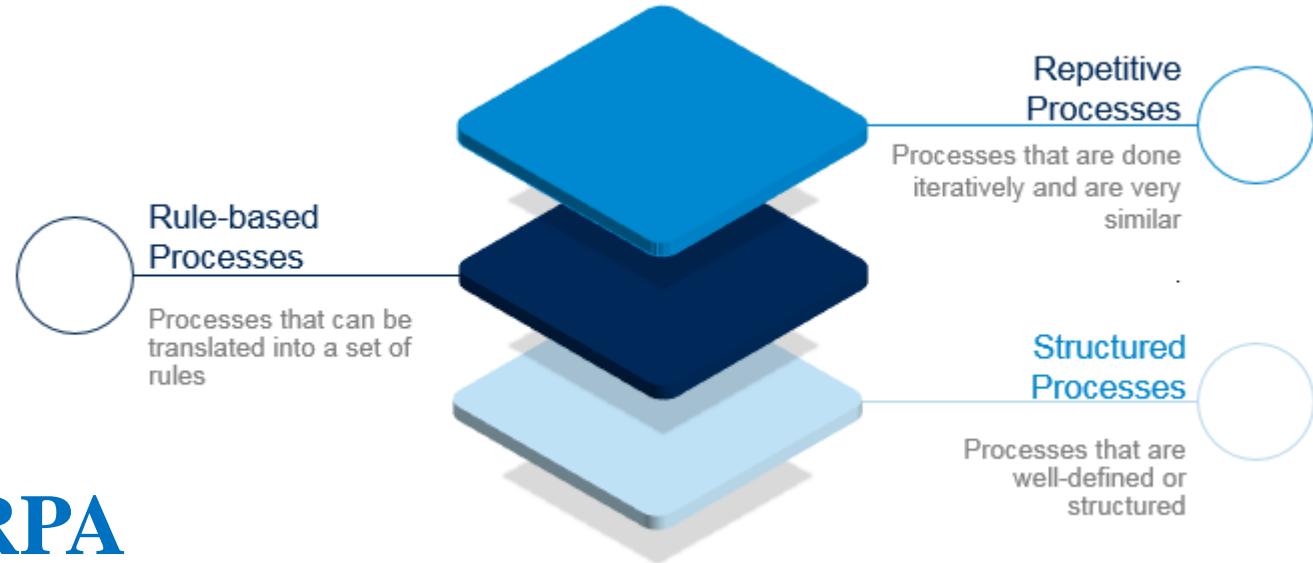
Robots interact with applications to execute rule-based tasks

RPA has led to the growth of virtual robotic workforce

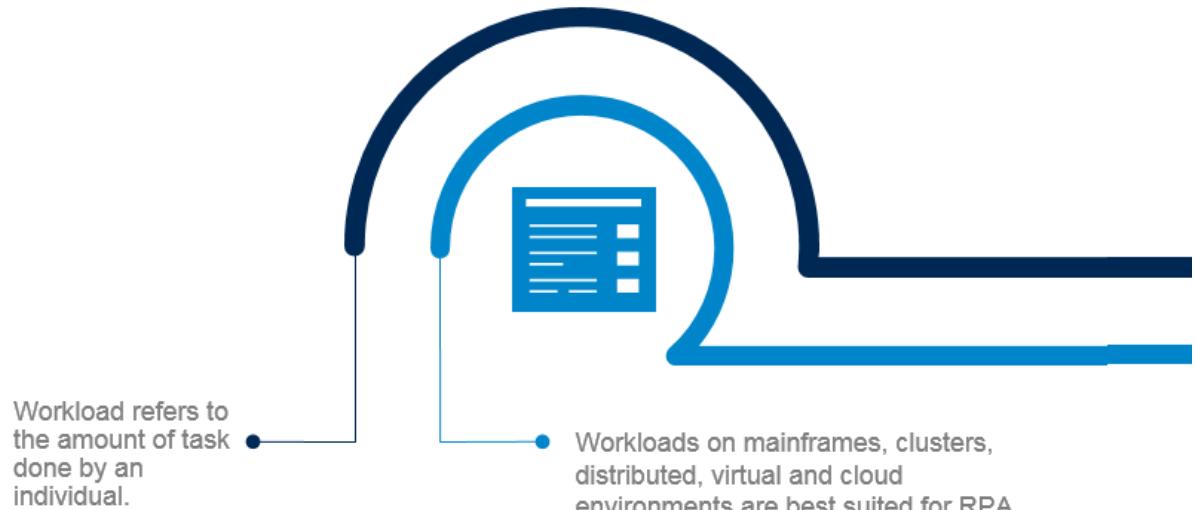


Processes Best Suited for RPA

Processes that are simple, structured and can be easily mimicked by a machine are best suited for RPA.



Workloads Best Suited for RPA



Workloads involving various business processes and transactions are a good candidate for RPA.

Advantages of RPA

Improved accuracy

Reduced cost of
process execution



Increased execution speed

Improved compliance and governance

Easier scaling

Advantages of RPA

- **Increased execution speed:**
 - RPA robots are much quicker and efficient than a human operator.
- **Improved accuracy:**
 - RPA leads to improved accuracy as the designed robot works on the given instruction.
- **Improved compliance and governance:**
 - RPA solutions have already been adopted to ensure regulatory compliance, especially in the banking sector. Since the Robot Login details are secure and unique, the activity carried out is well controlled and supervised leading to improved regulatory compliance. This creates transparency and allows the user to recognize any issue or defect easily.
- **Reduced cost of process execution:**
 - The work capacity of robots is superior to that of human workers. When an RPA solution is implemented, the task execution rate is considerably increased, and the corresponding costs are decreased. A robot can work 24*7, there is no time constraint. This increases the productivity time and improves the output.
- **Easier scaling:**
 - The amount of work involved in a process can vary, as unexpected changes are likely to occur in most business environments. If an RPA solution is used, companies can easily adapt by scaling the solution up or down, depending on the requirements, regardless of how volatile they might turn out to be.

Automation vs RPA

Automation	Robotics Process Automation
The method by which we improve the existing process and improve the efficiency is called automation	The advanced form of automation involving latest technology like screen scraping , workflow and Artificial intelligence
This was first time used in heavy industry by DS Harder an engineer working for Ford motors .	The term was coined by Blue Prism in 2012
Example: Heavy Industries like: Automobile, Manufacturing etc.	Example: Finance, Healthcare, Insurance etc.

Programming Constructs in RPA

- A process is defined as **a series of steps, activities, and decisions** involved in the way work is accomplished.
 - Very simple processes can be replicated as such, without other interventions. However, in case of complex business processes, an RPA developer needs to configure the workflow in order to make business decisions or do complex operations.
 - RPA involves the use of **robotic control flow to capture the logic and decisions of a business process**. RPA tools offer plenty of activities and technologies to match the needs and complexity of real-life processes.
 - There are typically two ways to represent a process:
 - As **a sequence**, where actions come one after the other
 - As **a flowchart**, where there are multiple decision points and logical branches
 - The process chosen for automation is split into simple actions and mapped in the RPA tool.
 - The RPA developer analyzes and configures the mapped process by introducing decision points, variables, pre-defined operations, and other types of elements available in the RPA tool.
 - Once the logic is replicated in the workflow, the process is ready for automation.

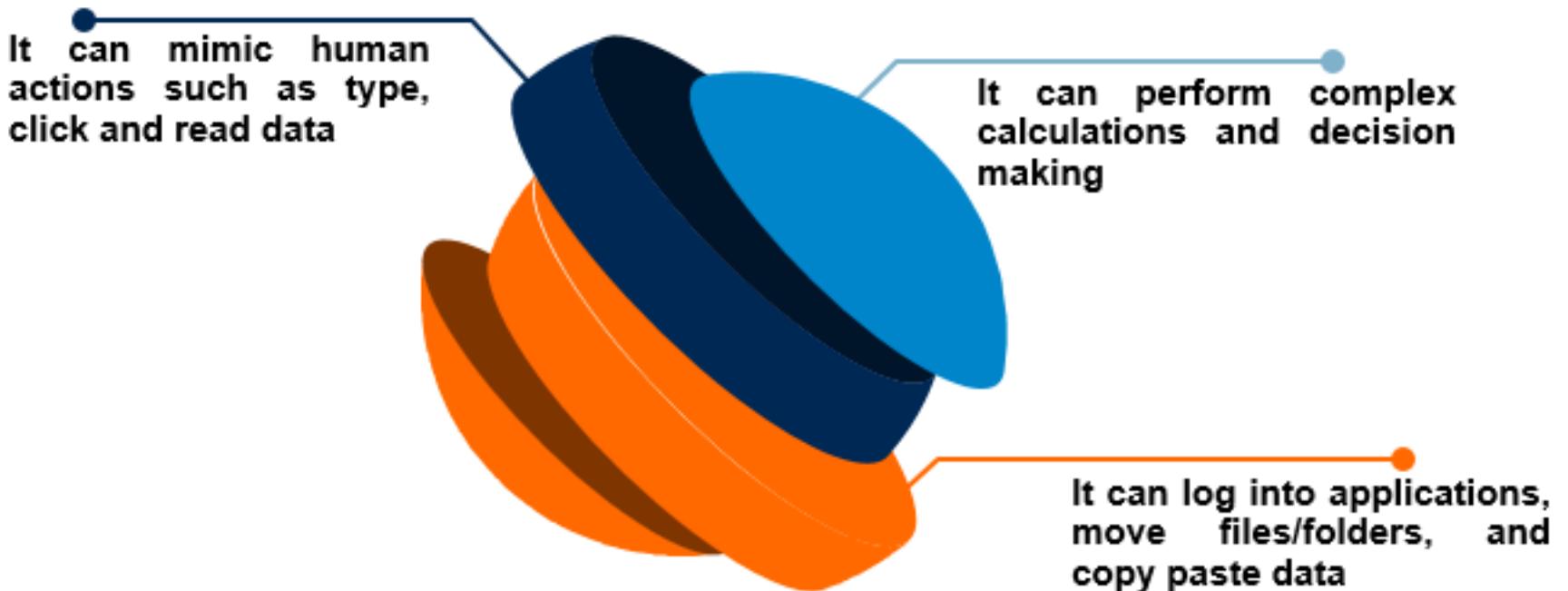
RPA Programming Constructs

- **Scope:** A scope is a specific context that is relevant to the program at any particular point in time. **The scope has to be very clear and defined for the success of the project.**
- **Validation:** At any step in a process or automation, there might need for validation. It is defined as the act of verifying the qualities of a process to ensure that they are correct. **Validating data in a process is often a critical requirement before execution.** Common examples are making sure that:
- **Input /Output:** For each piece of automation or algorithm, there might be an expected Input and/or Output. Any information or data that is sent to a computer for processing is considered input. **Input is the data at the entry point of the automation.** Any information that has been processed by and sent out from a computer or other electronic device is considered output. **Output is the data being returned at the end of the automation.**
- **Risk/Error Handling:** Every process should be evaluated for risk. This generally includes looking at every step of the process that can fail, or result in a failure later on in the process. This also involves quantifying how a possible failure could harm the overall system or business. By identifying all possible risks, error handling can be implemented to mitigate or completely reduce that risk. **Error handling makes programming effective and more reliable**, so that the activities executed by the program are useful and have zero impact on the productivity. No machine can be 100% efficient (ideal case) but we should try to minimize the error .
- **Optical Character Recognition (OCR):** OCR refers to the software that analyzes images for alphanumeric characters. It processes a digital image by locating and **identifying characters such as letters, numbers, and symbols.**

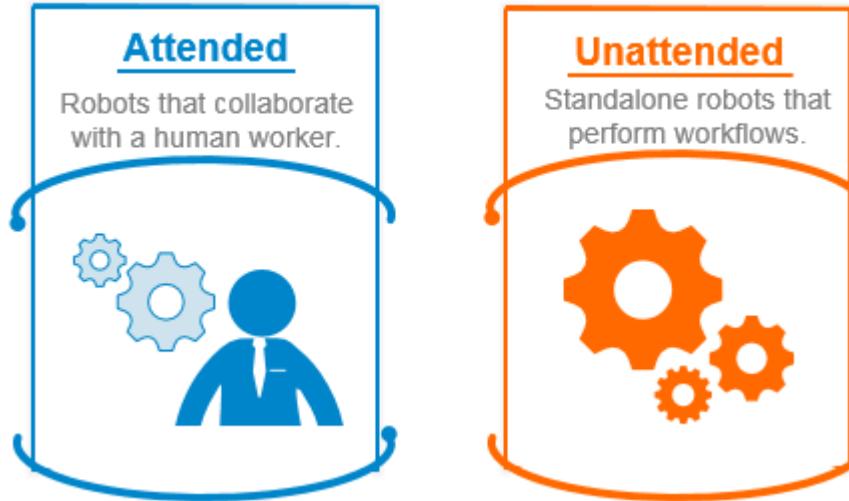
RPA Robot

A robot is a software that can execute workflows containing multiple steps.

- The software robots are designed for improving efficiency and saving time.
- They are versatile and work 24*7.
- They are efficient and are cost effective as they save resources .
- The software robot can perform task such as loop, control, pathfinding, data filtering, and sharing data.



Types of RPA Robots



- **Attended robots** collaborate **with human workers** on business activities, speeding up repetitive front-office tasks.
- They reside on the workstation of the human worker and are perfect collaborators in service desk, helpdesk, and call center activities.
- They work in the background and ensure high productivity and low handling times, while the human workers can continue to carry out their tasks unhindered.
- They need manual intervention and hence they are not fully automated. Manual intervention is required where human activity or intelligence is required for the further execution or completing the task.

- **Unattended robots** can operate **without human touch** on any variety of back-office activities.
- They can run in both physical and virtual environments. They can also be scheduled to start and stop at any time as per the business requirements.
- The unattended robots are maintained and guided remotely by server. These robots are designed to work end to end without any interventions.

What is Robotic Process Automation?

Nowadays, there is almost no aspect of our lives that is unaffected by automation. Some examples include:

- Washing machines,
 - Microwave ovens,
 - Autopilot mode for automobiles and airplanes,
 - Nestle using Robots to sell coffee pods in stores in Japan,
 - Walmart testing drones to deliver products in the US,
 - Bank checks being sorted using Optical Character Recognition (OCR), and ATMs
-
- The term **automation** is derived from the Greek words **autos** meaning **self**, and **motos**, meaning **moving**
 - Automation, in simple words, is **technology that deals with the application of machines and computers** to the production of goods and services. This helps in getting **work done with little or no human assistance**.
 - In the digital world, **automation and software development** are two different terms. Very often, however, one is confused with the other. **If some portion of a workflow can be programmed to be done without human intervention, it can be called automation.** For example, in order to pass any invoice in a payment system,
 - Developing an inventory management software system is called **software development**, while programming a step so that no more human intervention is required is called **automation**.

Scope and techniques of automation

What should be automated?

There are a few aspects that have to be taken into consideration for choosing automation candidates. The following processes should be automated:

- **Repetitive steps**
- **Time-consuming steps**
- **High-risk tasks**
- **Tasks with a low-quality yield**
- **Tasks involving multiple people and multiple steps**
- **And everything else!**

What can be automated?

In order to automate something, it needs to have the following characteristics:

- **Well defined and rule-based steps**
- **Logical**
- **An input to the task can be diverted to the software system**
- **Input can be deciphered by software systems with available techniques**
- **The output system is accessible**
- **Benefits are more than the cost**

Robotic Process Automation

Robot in Robotic process automation means **software programs** that **mimic human actions**.

- In simple words, RPA involves the use of **software that mimics human actions** while interacting with applications in a computer and accomplishing rule-based tasks.
 - This often requires reading from and typing, or clicking on existing applications that are used to perform the given tasks.
- In addition, these **software Robots also perform complex calculations and decision making** on the basis of the data and predefined rules
- Today, RPA has matured beyond doing **mundane repetitive tasks**, and is seen as a transformational technology that can bring tremendous value to the organization adopting it. The ability to create full audit trails is significant for **improving the quality of work being done and eliminating human error**

Benefits of RPA

Business process outsourcing (BPO): With RPA and its benefits of reduced costs, the BPO sector can now depend less on outsourced labor.

Insurance: The complexity and number of tasks that must be managed in the insurance sector, from managing policies, to filing and processing claims across multiple platforms, provides an ideal environment for the use of RPA technology.

Financial sector: From day-to-day activities and handling an enormous amount of data, to performing complex workflows, RPA has been helping to transform this sector into an efficient and reliable one.

Utility companies: These companies (such as gas, electricity, and water) deal with a lot of monetary transactions and can leverage RPA to automate tasks such as meter reading, billing, and processing customer payments.

Healthcare: Data entry, patient scheduling, and more importantly billing and claims processing, are important areas where RPA can be used. RPA will help in optimizing patient appointments, sending them automatic reminders of their appointments and eliminating human error in patient records. This leaves workers to focus more on the needs of the patients, and also leads to improved patient experience.

Higher quality services, greater accuracy: With reduced human error and greater compliance, the quality of work is much better. , the detection of errors is much simpler in RPA. This is because every step in the automation process is recorded, making it faster to pinpoint errors with ease.

Improved analytics: Since these software Robots can log each action taken with the appropriate tag and metadata, it is very easy to get business insights and other analytical data.

Reduced costs: Nowadays, it is commonplace to hear that one Robot is equivalent to three human full-time executives (FTE). This is based on the simple fact that one FTE works for eight hours a day, while a Robot can work for 24 hours without a break. Increased availability and productivity means the cost of operations is reduced tremendously.

Increased speed: Robots are very fast and sometimes the speed of execution has to be reduced to match the speed and latency of the application on which these Robots work. Increased speed can result in better response times and an increase in the volume of the tasks being performed

Scalability: RPA is highly scalable, up as well as down. Whether one requires an increase or reduction in the virtual workforce, Robots can be quickly deployed at zero or minimum costs while maintaining consistency in the quality of work.

Better management: RPA allows for managing, deploying, and monitoring Robots through a centralized platform. This also lessens the need for governance.

Benefits of RPA

RPA has led to an improvement in the quality of work and made processes more scalable, resulting in:



Implementation of RPA

RPA has been implemented in various business areas to perform repetitive and time-consuming tasks.

HR Services



Process Examples:

- Recruitment
- Payroll
- Personnel administration

Finance and Accounting



Process Examples:

- Procurement to pay
- Order to cash
- Vendor management

IT Services



Process Examples:

- Password reset
- Account unlock
- Chatbot integration

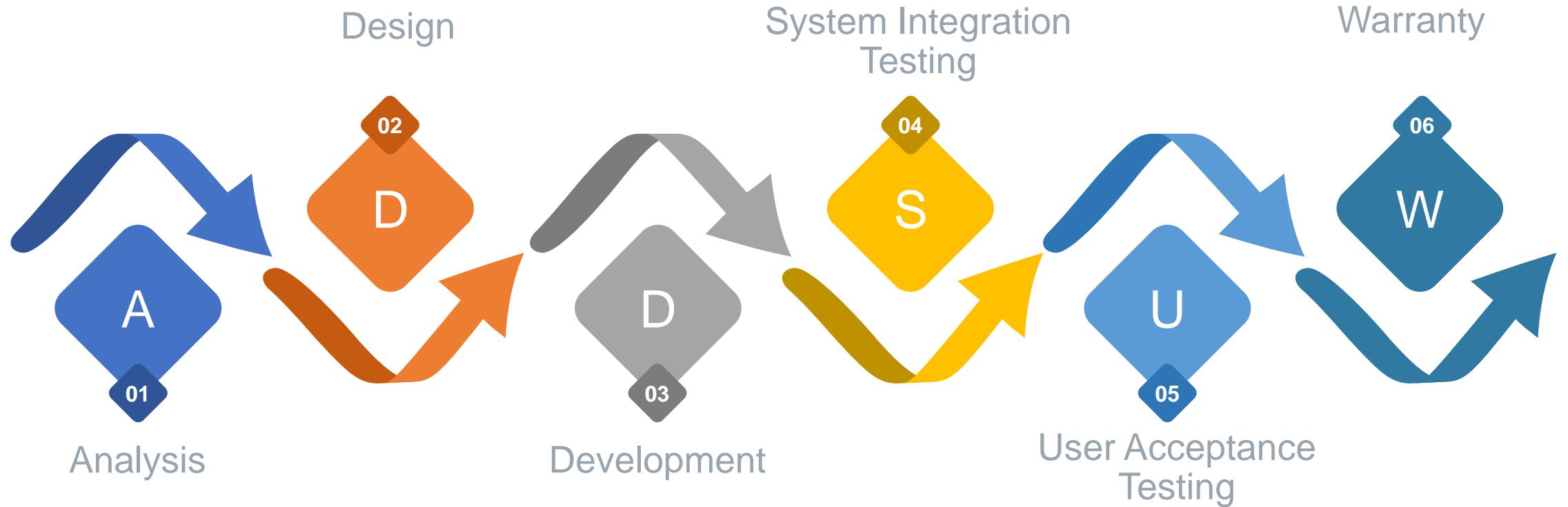
Supply Chain



Process Examples:

- Inventory Management
- Invoice/Contract Management
- Work Order Management

RPA Development Method



Stage 1: Analysis, where the process to be automated is mapped (AS IS)

Stage 2: Design, in which the TO BE (automated) process is defined, together with the technical solution

Stage 3: Development, where the automations are actually built

Stage 4: System Integration Testing, where the functional systems are being tested with the automation

Stage 5: User Acceptance Testing, where the solution is tested by the process owner and QA

Stage 6: Warranty, where the solution is being moved to production

Software Development Life Cycle (SDLC)



How Projects Really Work (version 1.5)

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How the customer explained it



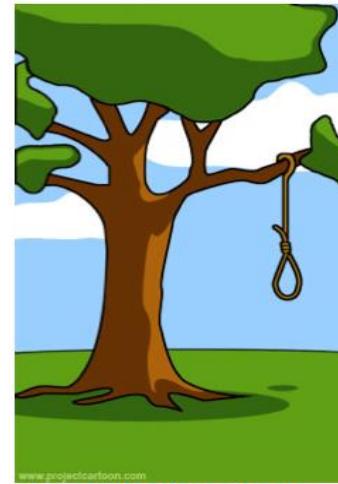
How the project leader understood it



How the analyst designed it



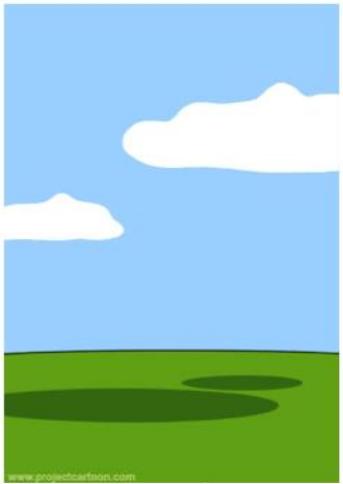
How the programmer wrote it



What the beta testers received



How the business consultant described it



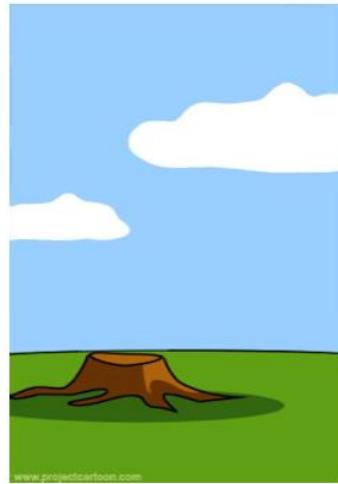
How the project was documented



What operations installed



How the customer was billed



How it was supported



What marketing advertised



What the customer really needed

How does RPA Work?

1. The process chosen for automation is **separated** into simple actions and **mapped** in the RPA tool.
 2. There are two ways to **represent** a process:
 - As a **sequence**, where actions come one after the other
 - As a **flowchart**, where there are multiple decision points and logical branches
 3. The RPA Developer analyzes the mapped process and **configures** the process by introducing decision points, variables, pre-defined operations, and other types of elements available in the RPA tool.
 4. Once replicated in the workflow, the process is **ready for automation**.
- RPA replicates the actions that were presented by the **user using the graphical user interface**. Basically, the tool tries to draw the process, to be able to translate it into small steps, and understand its underlying logic.
 - Very simple processes can be replicated as such, without other interventions. However, more complex business processes, require **RPA Developer to configure the workflow** in order to make business decisions or perform complex operations.
 - RPA tools offer plenty of activities and technologies for matching the needs and complexity of real-life processes. In fact, RPA not only replicates the actions demonstrated by the user it also **uses robotic control flow to capture the logic and decisions of a business process**.
 - Once the business logic has been replicated in the workflow, the automation is ready to be implemented.

Challenges in RPA

Some of the challenges faced by the developer in RPA are:



Input Standardization required	Maintenance of RPA	Business Case Issue	Business-IT Collaboration	Weak Governance	Human Workforce Resistance
The processes to be automated need to be based on well-defined standard operating procedures.	Maintenance of RPA is costlier and one of the biggest issues and challenges in RPA is infrastructure.	Implementing successful RPA is a challenge that requires lots of approval and validations.	Both business operations and IT bring specific value in RPA projects	Many companies underestimate the work required after initial automation	Without the right communication and training, employees may sabotage voluntarily or not the RPA journey

Some of the challenges faced by the developer in RPA are:

- **Input Standardization required:** The processes to be automated need to be based on well-defined standard operating procedures (SOPs) where the rules for decision-making have very clear parameters.
- **Maintenance of RPA is costlier:** Maintenance is key when it comes to keeping RPA up and running. If we are not establishing a regularly scheduled maintenance protocol, we'll find immediate issues with our RPA that might be reoccurring.
- **Business case issue:** Implementing successful RPA is a challenge that requires lots of approval and validations. One of the basic challenges is the unavailability of business cases.
- **Business-IT collaboration (challenge):** A company's business operations team takes a macro-perspective on long-term goals to carefully select optimized workflows for automation and closely monitors analytics to ensure that process accuracy, cost reduction, and customer satisfaction benchmarks are met during implementation. . RPA implementation success is both IT- and business-driven, with RPA governance sitting directly in the space between business and IT.
- **Weak Governance:** Once the RPA is implemented, we need to ensure that the RPA is governed properly as the maintenance is very much required. The working Robots do not assure 100% performance if they are not well maintained and regulated hence there should be an efficient model and regulation to maintain the same.
- **Human workforce resistance:** Many automated processes still rely on human intervention in exception handling or in connected processes. Communicating effectively and training will ease the normal resistance that humans have and address the before/after the RPA implementation gap.

RPA platforms

Automation Anywhere

Automation Anywhere helps to automate business processes for companies. They focus on RPA, cognitive data (machine learning and natural language processing), and business analytics. Their bots are capable of handling both structured as well as unstructured data. The system has three basic components:

1. *A development client* for the creation of a bot
2. *A runtime environment* for the deployment of a bot
3. *A centralized command system* for handling multiple bots, analyzing their performance:
 - HQ: San Jose, California, USA
 - Est: 2003
 - CEO: Mihir Shukla
 - Some key clients: Deloitte, Accenture, AT&T, GM, J P Morgan Chase
 - Source of revenue by region: Its highest source of revenue is the USA, which accounts for more than half its revenue, followed by APAC, then UK and continental Europe
 - Source of revenue by industry: The Banking, Financial services, and Insurance (BFSI) accounts for more than half of its revenue, followed by healthcare, telecom, media, and others

WorkFusion

WorkFusion offers automation that is based on RPA and machine learning. It delivers software as a solution for automating high volume data. WorkFusion enables man and machine to work in tandem while managing, optimizing, or automating tasks:

- HQ: New York, USA
- Est: 2011
- CEO: Max Yangkelovich, Andrew Volkov
- Key Clients: Thomson Reuters, Infogroup, Citi, and Standard Bank
- Source of revenue by region: North America provides more than 80% of WorkFusion's revenue, followed by Europe, APAC, and MEA
- Source of revenue by industry: Around 90% of its revenue comes from the BFSI sector, followed by the retail and consumer sectors

Blue Prism

Blue Prism aims to provide automation that enterprises can use according to their needs. Blue Prism aims to do this by providing automation that is scalable, configurable, and centrally managed. It sells its software through its partners, some of which are Accenture, Capgemini, Deloitte, Digital Workforce Nordic, HPE, HCL, IBM, TCS, Tech Mahindra, Thoughtonomy, and Wipro:

- HQ: United Kingdom
- Est: 2001
- CEO: Alastair Bathgate
- Key Clients: BNY Mellon, RWE npower, and Telefonica O2
- Source of revenue by region: More than half of its revenue source comes from the UK, followed by North America, Continental Europe, and APAC
- Source of revenue by industry: BFSI, health, and pharmaceuticals, retail and consumer, telecom and media, manufacturing, public sector, travel, and transportation

UiPath

UiPath is an RPA technology vendor who designs and delivers software that helps automate businesses. The RPA platform consists of three parts:

- *UiPath Studio* to design the processes
- *UiPath Robot* to automate tasks designed in UiPath Studio
- *UiPath Orchestrator* to run and manage the processes:
 - HQ: Bucharest, Romania
 - CEO: Daniel Dines
 - Key Clients: Atos, AXA, BBC, Capgemini, CenturyLink, Cognizant, Middlesea, OpusCapita, and SAP
 - Source of revenue by region: North America, Continental Europe, the UK, and APAC
 - Source of revenue by industry: BFSI, healthcare, telecom and media, and retail

UiPath Studio

- UiPath Studio is the development environment of UiPath.
- It is the primary tool to develop UiPath Robots. It can be used to configure steps of a task or launch a full recorder to record a sequence of steps. The recording facility in the Studio is a game-changing feature for RPA tools.
- By using the drag-drop facility from the toolbox, you may write a whole sequence of workflows to perform a set of tasks by Robots. These steps look like a data flow diagram and are very easy to understand. It is one of the simplest visual flow diagramming tools
- The designer gives you full control of the execution order and actions taken, also known as activities. An activity or action includes clicking a button, writing and reading a file, and so on.

Bot Development: Installation of UiPath

Developing a basic bot does not require programming experience. we'll look at how to create a bot by using the UiPath platform. There are several reasons why, such as the following:

1. UiPath is one of the most popular systems on the market.
2. There is a free version of the software.
3. UiPath has a modern interface that is relatively easy to use.
4. There are helpful features like search, debugging, and monitoring of bots.
5. UiPath comes with hundreds of prebuilt actions, which helps to streamline the bot development process.
6. The software can record actions across many environments like the desktop, web, terminals, and Citrix applications.
7. There are a large number of integrations, such as with Google and Microsoft.

Installation of UiPath

There are two main versions of UiPath. There is the Enterprise platform, which requires the payment of a license (based on factors like the number of bots used). However, you can evaluate it for free for up to 60 days.

Bot Development: Activities

When creating bots, you will spend much time in the Design part of the UiPath Studio and work quite a bit with the Activities . Some of these will involve simple drag and drops with a little configuration.

Workflow: When creating a bot, you will usually start here, say, with a flowchart or sequence. With the Sequence, there are a myriad of programming-type constructs that help with the logic. Just some include Do While, For Each, If, Break and Continue, just to name a few.

UI Automation: Here are the main types of automations for OCR (screen scraping and extraction), text, windows, image management, elements (like the mouse and keyboard), and the browser. For example, when you select browser, you can navigate across web pages and even include JavaScript. Or, with a window, you can do things like hide it, maximize it, and restore it.

Programming: This involves more sophisticated coding functions. You can engage in database actions, debugging, and setting of variables.

Orchestrator : This is where you can manage and schedule bots. You can also work with setting up credentials for access.

App Integration: This is a major area and UiPath Studio comes with a handful of integrations like CSV, Excel, and mail.

Computer Vision: Here you will find powerful AI features to help with identification of text and other items on a screen.

System: This shows how extensive UiPath works with a desktop system. You can create/copy/append/move files, detect if a path or file exists, work with the clipboard, open and close applications, manage environment variables and passwords, and invoke PowerShell scripts

The UiPath platform is available in two variations:

1. Enterprise Edition:

- This edition is suitable for large companies starting their RPA projects and looking to scale their Robot deployments in the future. It is integrated with UiPath Orchestrator (we will discuss UiPath Orchestrator later).
- This version can be updated by visiting the UiPath website and by downloading the newest version of the UiPath platform installer. Running the installer automatically replaces all the old files without modifying any of your settings.

2. Community Edition:

- This is suitable for individual developers and small organizations with fewer employees. The Community Edition is always up-to-date, and it automatically updates itself as soon as a new version is available.

The Main Types of Project supported by UiPath Studio:

Sequence: This is suitable for simple actions or tasks.

- It enables you to go from one activity to another, without interfering with your project.
- It consists of various activities. Creating sequences is also useful for debugging purposes.
- One activity from a particular sequence can easily be tracked.
- The Basic type of project can be started using the Blank option in the start tab and then adding the sequence in the diagram from the toolbox

Flowchart: This is suitable for dealing with more complex projects.

- It enables you to integrate decisions and connect activities. To start this kind of project, choose the Flowchart - Simple Process option from the new project menu.

State machine: This is suitable for very large projects that use a finite number of states in their execution, triggered by a condition.

- To start this kind of project, choose the Process - Transaction Business Process option from the new project menu:

Assistant: This is suitable for developing attended or Front Office Robots:

- sometimes these Robots are called assistants. To start this kind of project, choose the Assistant - Agent Process Improvement option from the new project menu.

Getting Started: UiPth Studio

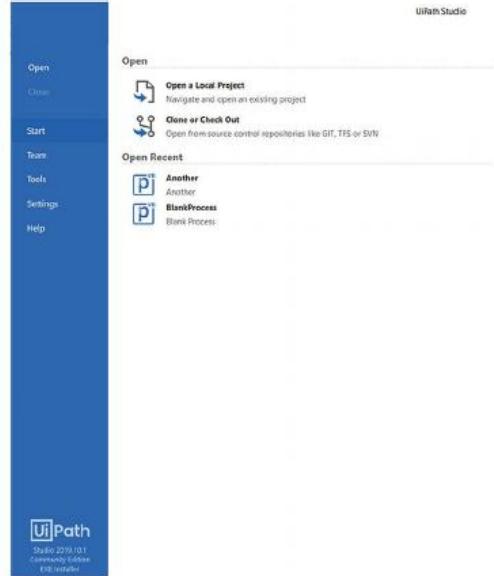


Figure 7-2 This is the initial screen for the UiPath Studio

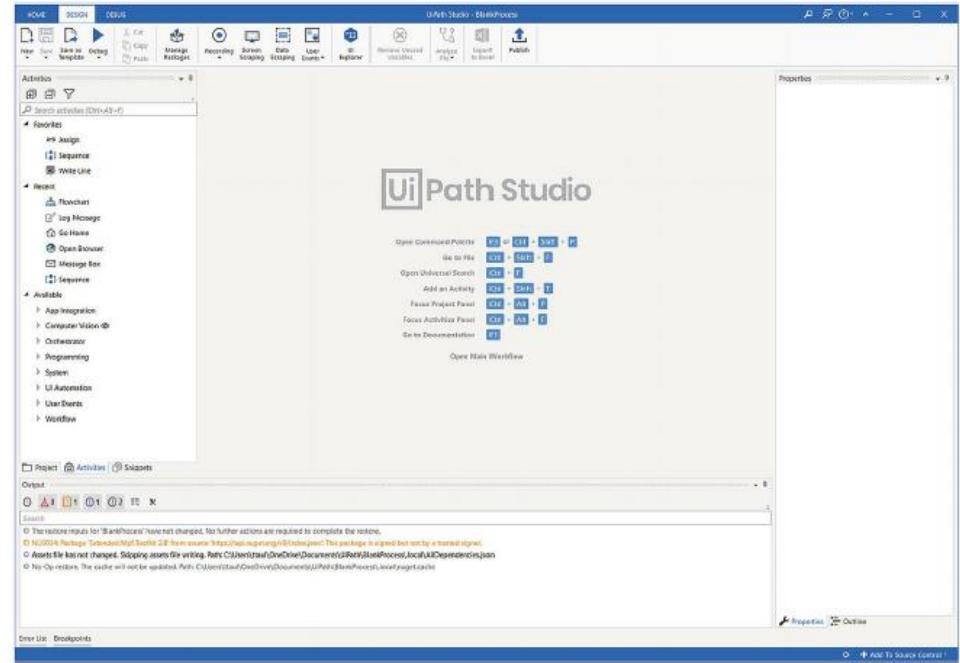


Figure 7-3 This is the design screen for the UiPath Studio

Getting Started: UiPth Studio

Open: You can navigate your computer system to **select a UiPath process or select one you've already saved**. The “Clone or Check Out” is an advanced feature, which allows you to use version control (say with Github). This means you can track the development of the process with comments and other information. This can be particularly useful when working in collaboration with others.

New Project: Here, you can **create a new process completely from scratch** or you can make one for later reuse (it will become part of a library).

New Template: These are prebuilt processes. If one meets your needs, you can speed up the development process. For example, there is a template that has a flow chart. Then there are more advanced ones, such as for developing enterprise-grade bots.

Help: This is comprehensive, including product documentation, community forum, help center, academy, and release notes. Also, when you click the “Help” button, you will see details on the right side of the screen. One is the activation ID (this is helpful if you want to upgrade) and the “Update Channel,” which means UiPath Studio will either be updated with the stable release or betas (which are not as reliable and may have bugs).

Settings: You have functions like auto backup and the changing of the UI theme (either light or dark).

Tools : Here, you can **install functions to allow the use of different browsers, like Chrome, Edge, and Firefox**. There are also extensions for Java, Citrix, and advanced Windows functions.

UiPath stack

UiPath Studio

- UiPath Studio helps users with no coding skills to design Robotic processes in a visual interface. It is a flowchart-based modeling tool. Thus, automation is faster and more convenient. Multiple people can contribute to the same workflow.

UiPath Robot

- UiPath Robot runs the processes designed in UiPath Studio. It works in both attended (working only on human trigger) and unattended environments (self-trigger and work on their own).

UiPath Orchestrator

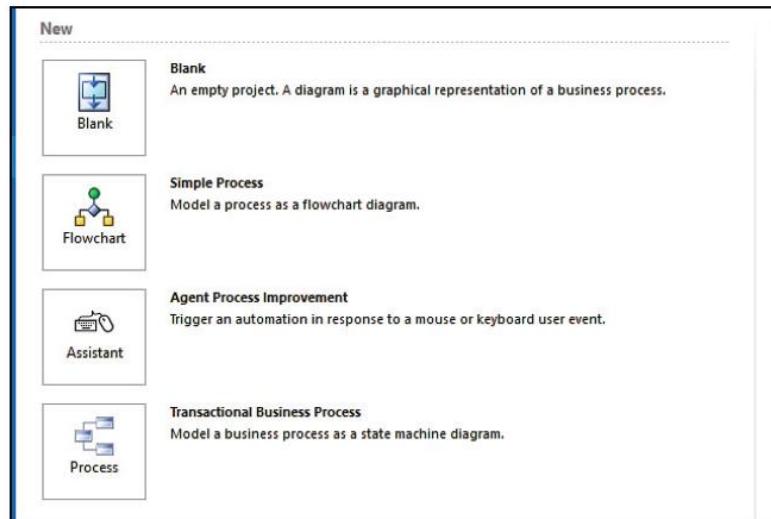
- UiPath Orchestrator is a web-based platform that runs and manages Robots. It is capable of deploying multiple Robots, and monitoring and inspecting their activities.

Downloading and installing UiPath Studio

To learn UiPath, you need the software. Fortunately, UiPath has provided multiple options to learn and use the platform. You may get a free trial for 60 days, which is the fully working Enterprise Edition, or you may opt for the Community Edition, which is free for learning purposes. Commercial use, however, is not allowed.

The UiPath Community Edition has the following features:

- Auto update
- No server integration
- Community forum for support
- Online self-learning
- No complex installation required
- Online activation is mandatory



For individuals and small professional teams.

First Name*

Please complete this required field.

Last Name*

Please complete this required field.

Email*

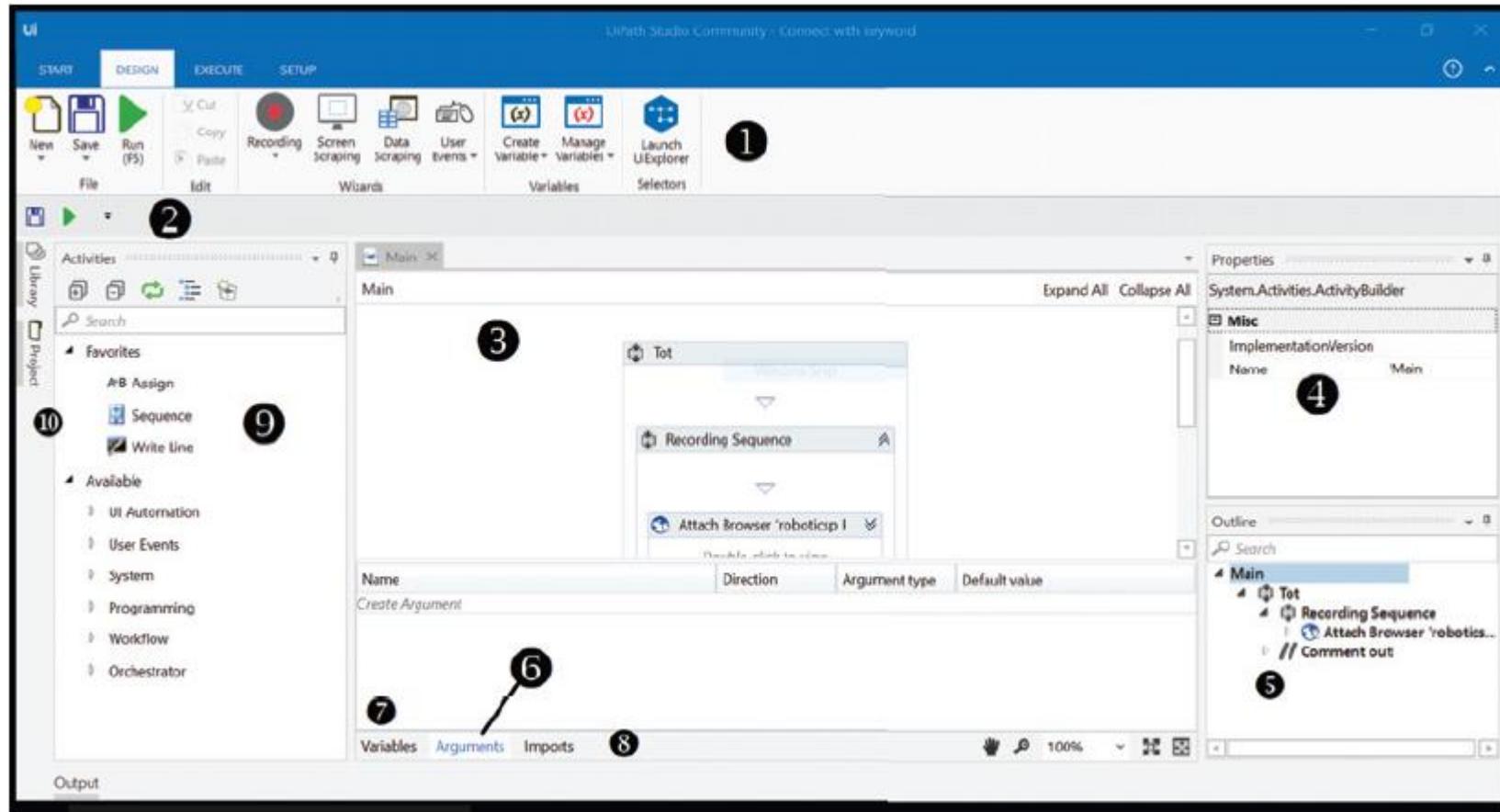
Twitter User

Example: @uipath

REQUEST COMMUNITY EDITION

A screenshot of a web form for requesting the Community Edition. The form includes fields for First Name, Last Name, Email, and Twitter User, each with a red border indicating they are required. Below the form is a large blue button labeled 'REQUEST COMMUNITY EDITION'.

The user interface



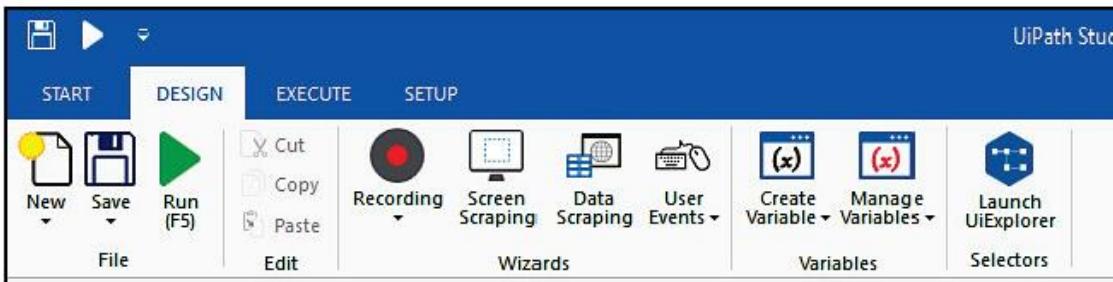
1. The Ribbon
2. Quick Access Toolbar
3. Designer panel
4. Properties panel
5. Outline panel
6. Arguments panel
7. Import panel
8. Activity panel
9. Library panel
10. Project panel
11. Output panel

Getting Started: UiPth Studio

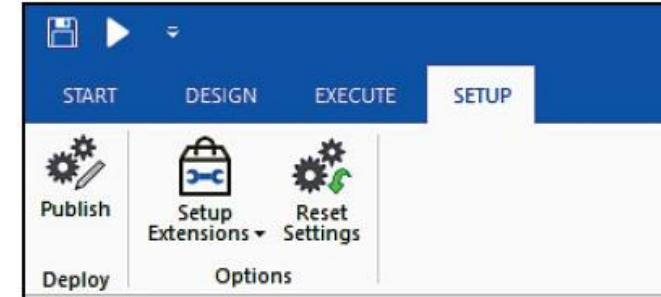
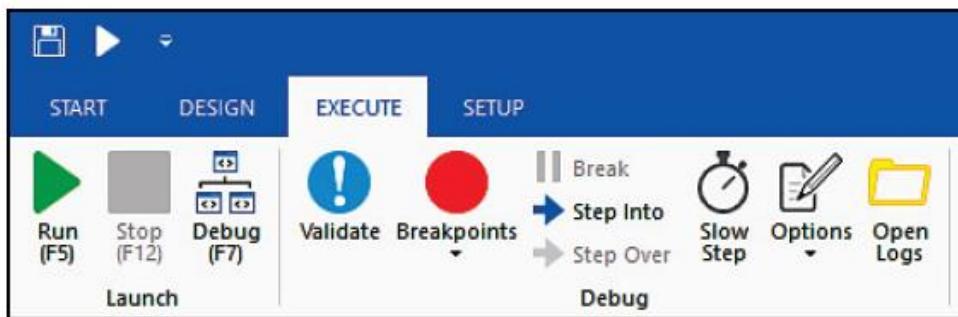
The Ribbon

This panel located at the top of the user interface and consists of four tabs:

1. **START:** This is used to start new projects or to open projects previously made.
2. **DESIGN:** This is to create new sequences, Flowcharts, or state machines, or to manage variables:

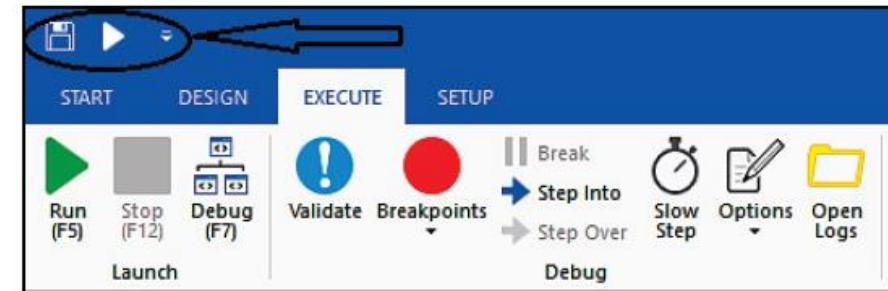


3. **EXECUTE:** This is used to run projects or to stop them, and also to debug projects:



The Quick Access Toolbar

This panel gives the user a shortcut to the most used commands. One can also add new commands to this panel. This is located above the Ribbon on the user interface. The Quick Access Toolbar has been circled in the following screenshot and is indicated by the arrow:



Getting Started: UiPth Studio

Designer panel:

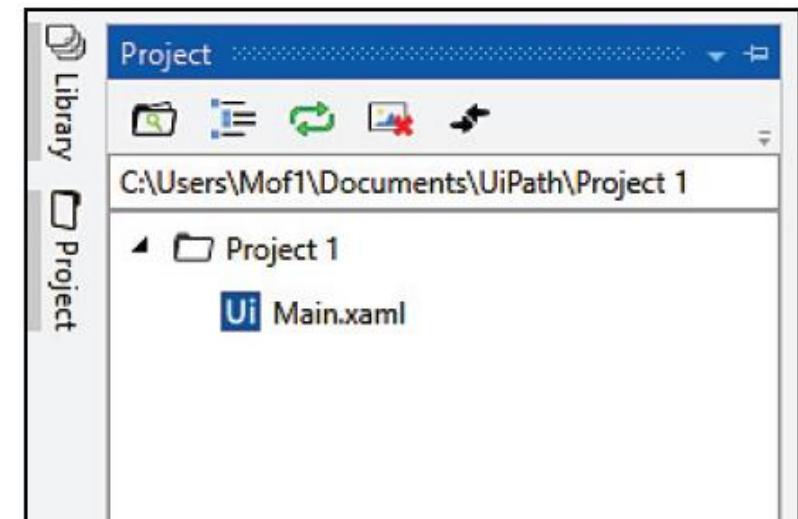
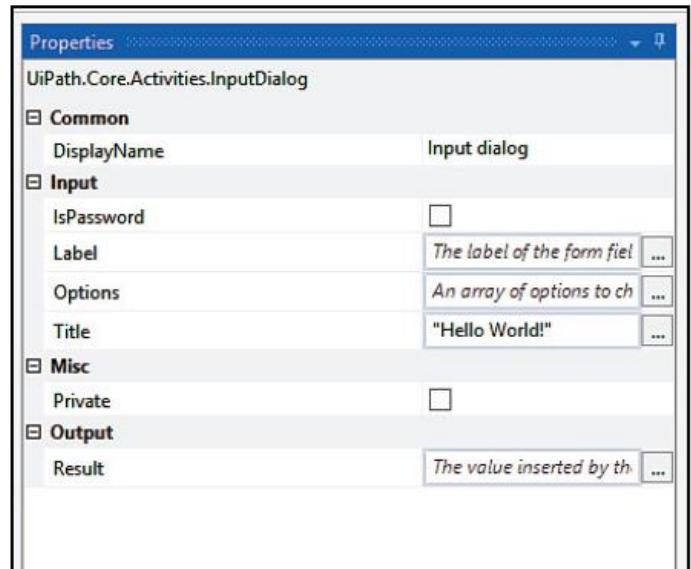
- This is the panel where one defines the steps and activities of the projects. It is where a developer does most of the things to record activities or manually drop activities on the canvas. In UiPath, this is equivalent to the code windows of Microsoft Visual Studio. When we develop a Robot, this is the window where we will be organizing various activities in a flow or chain to accomplish a task. The project a user makes is clearly displayed on the Designer panel and the user has the option of making any changes to it.

Properties panel:

- The panel located on the right-hand side of the user interface is for viewing the properties of the activities and for making any changes, if required. You need to select an activity first and then go to the Properties panel to view or change any of its properties

Activities panel

- Located on the left-hand side of the user interface, this panel contains all the activities that can be used in building the project. The activities can easily be used in making a project by simply dragging and dropping the required activity into the required location in the Designer panel.



UiPath Platform Overview

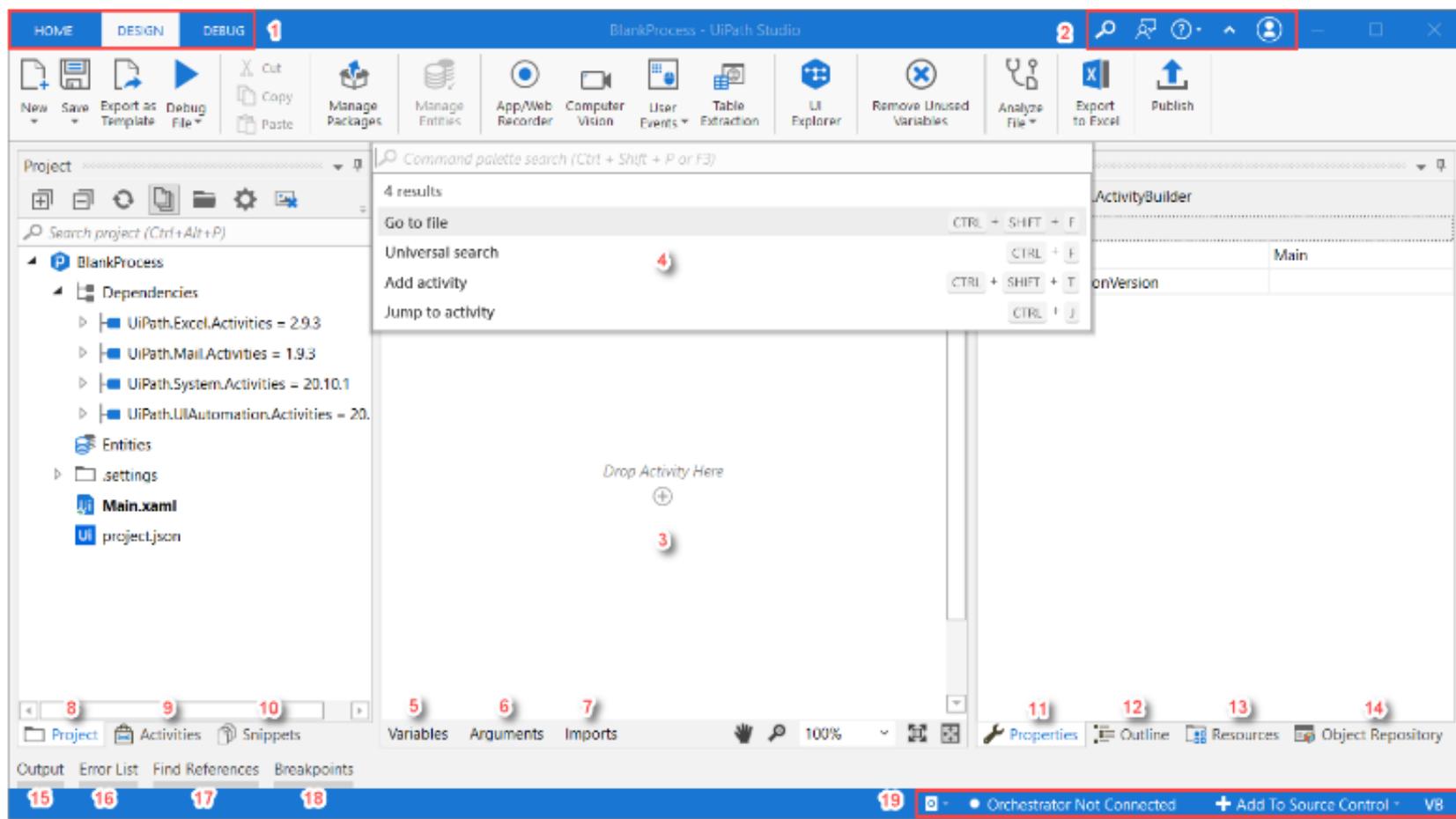
The screenshot shows the UiPath Studio Community Edition interface. The top navigation bar has tabs: HOME, DESIGN (selected), and DEBUG. Below the tabs is a toolbar with icons for New, Save, Export as Template, Debug, Cut, Copy, Paste, Manage Packages, Manage Entities, Recording, Screen Scraping, Data Scraping, User Events, UI Explorer, Remove Unused, Analyze, Export to Excel, and Publish.

The main workspace displays the 'Ui Path Studio COMMUNITY EDITION' logo. A central dialog box titled 'New Sequence' is open, prompting the user to 'Create a new sequence workflow'. It contains fields for 'Name *' (set to 'Sequence') and 'Location *' (set to 'C:\Users\Ganeshayya\OneDrive\Documents\UiPath\PG-1'). A red box highlights the 'Name' field. At the bottom of the dialog is a 'Create' button.

On the left side, there's a sidebar with sections for Activities (Favorites: Assign, Sequence, Write Line; Recent; Available: App Integration, Computer Vision, Orchestrator, Programming, System, UI Automation, User Events, Workflow) and Resources (Object Repository, Resources).

At the bottom, there are tabs for Project, Activities, Snippets, and Output/Error List/Find References/Breakpoints. The bottom right corner shows user information (ganeshayya@gmail.com's...) and project control buttons (Add To Source Control, VB).

The User Interface



<https://docs.uipath.com/studio/v2020.10/docs/the-user-interface>

- 1 Ribbon Tabs
- 2 Title Bar
- 3 Designer Panel
- 4 Command Palette
- 5 Variables Panel
- 6 Arguments Panel
- 7 Imports Panel
- 8 Project Panel
- 9 Activities Panel
- 10 Snippets Panel
- 11 Properties Panel
- 12 Outline Panel
- 13 Resources Panel
- 14 Object Repository Panel
- 15 Output Panel
- 16 Error List Panel
- 17 Find References Panel
- 18 Breakpoints Panel
- 19 Status Bar

UiPath Platform Overview

UiPath Orchestrator

- Orchestrator, the heart of automation management, is **a web application that allows managing, controlling, and monitoring the robots and the automations.**
- With Orchestrator we can deploy, trigger, measure, provision, track, and ensure the security of every robot in the organization.
- Orchestrator also functions as a repository for libraries, reusable components, assets, and processes used by robots or by developers.

The main capabilities of Orchestrator:

- **Provisioning:** Creates and maintains the connection with robots.
- **Control and license distribution:** Enables the creation, assignment and maintenance of licenses, roles, permissions, groups, and folder hierarchies. RPA developers can now connect their robots to an ever-growing list of supported platforms and technologies, and manage the distribution of licenses, roles, permissions, groups, and folder hierarchies. More information about the features and benefits of Orchestrator can be found in the [What it does?](#) section.
- **Automation storage and distribution:** Allows the controlled storage and distribution of automation projects, assets, and credentials, as well as large files used in automations.
- **Running automation jobs in unattended mode:** Enables the creation and distribution of automation jobs in various ways, including through queues and triggers.
- **Monitoring:** Allows monitoring of jobs and robots and stores logs for auditing and compliance.

UiPath Orchestrator

What it does?

Deploys, manages and optimizes your Robots with enterprise-scale integrations and compliance.

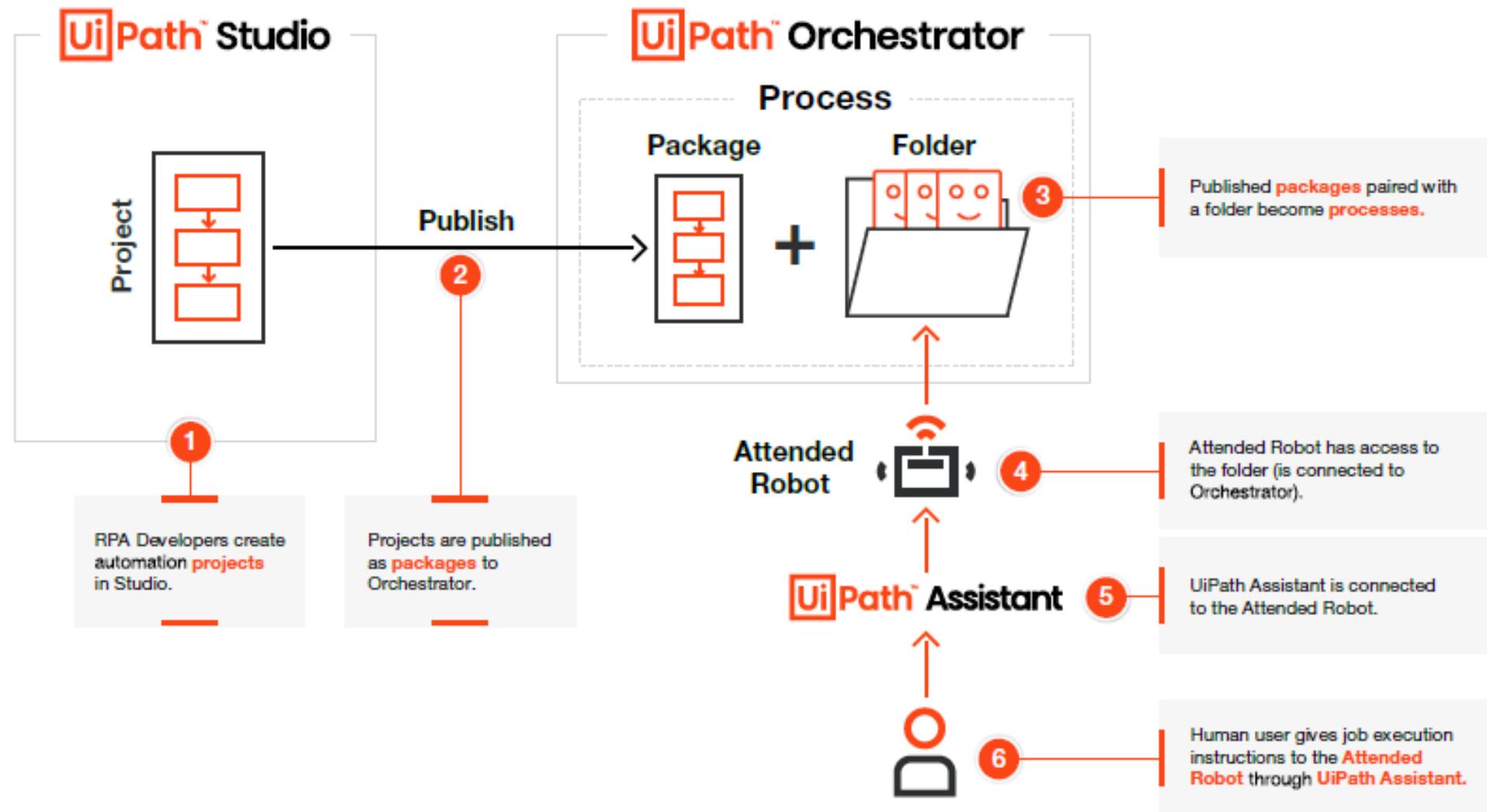
Example

When a certain number of invoices to be processed are added to queue, the robot is triggered and starts processing them.

Users

RPA Developer, IT Admin, CoE Admin

Core Components:



Orchestrator UiPath Cloud

<https://cloud.uipath.com/>

The screenshot shows the Orchestrator Services dashboard. On the left sidebar, there are icons for Home, Orchestrator, Studio, Apps, Integration Service, Admin, and More. The main content area displays a greeting "Good morning, Ganeshayya Shidaganti". Below it, the "Orchestrator Services" section lists a single item: "RamaiahInstituteofTechnologyDe... Last Updated: 38 days ago". A "Manage" button is located to the right of this list. The "License Allocation" section shows two categories: "Attended - Named User" (2 of 2) and "Automation Developer - Named User" (2 of 2). To the right, there is a sidebar with the heading "Design your workflows in UiPath Studio" and a "Download Studio" button. Below this, the "What's new" section highlights "UiPath 2022.10 product highlights you don't want to miss" and a "Read the blog" link. It also mentions "New Adobe connectors accelerate document processing automation" and a "Now on the UiPath Marketplace" link.

UiPath Automation Cloud™

Home

Orchestrator Services

RamaiahInstituteofTechnologyDe...
Last Updated: 38 days ago

Manage

License Allocation

Users Robots & Services

Attended - Named User 2 of 2

Automation Developer - Named User 2 of 2

Design your workflows in UiPath Studio

Build your automation project in UiPath Studio, our complete solution for application integration. [Learn more](#)

[Download Studio](#)

What's new

UiPath 2022.10 product highlights you don't want to miss.

[Read the blog](#)

New Adobe connectors accelerate document processing automation.

[Now on the UiPath Marketplace](#)

UiPath Orchestrator

UiPath Orchestrator

Home Orchestrator Studio Apps Integration Service Admin More

Tenant

- My Folders
- Search
- Default
- GaneshRPA
- Shared
- TestRPA

Home Automations Monitoring Queues Assets Storage Buckets Testing Settings

Processes Assets Queues Triggers Users Machines

Jobs Status

Running	Pending
0	0

Stopping	Terminating
0	0

Suspended	Resumed
0	0

Jobs History

No jobs

Variables and Arguments in Studio

What are variables?

Variables are containers that can hold multiple data entries (values) of the same data type.

EmailAddress can be a variable that holds the value "rpadeveloper@uipath.com".

Likewise, the speed of a car, the age of a person, bank account balance, and marks obtained in an examination are some examples of variables.

The value of a variable can change through an external input, data manipulation, or passing from one activity to another.

Name	Variable type	Scope	Default
FirstName	String	Sequence	Enter a VB expression
PhoneNumber	Int32	Sequence	Enter a VB expression
Create Variable			
Variables	Arguments	Imports	

Properties of Variables

	Name Title of the information stored by the variable		Type Type is classification of variable based on the type of data it is intended to store.
	Value The expression value assigned to the variable		Scope Designate which parts of the program can see it or use it (local, global)
	Lifetime Lifetime of a variable ends when program leaves its scope		Location (Memory) The place where variable is stored in the computer hardware

Types of Variables

	Number Stores Numerical Data		Array Stores multiple values		String Stores Text
	Date & Time Stores Date and Time		Boolean Stores True or False		DataTable It stores the information

Variables and Arguments in Studio

To use RPA, you need to have a good understanding of variables. **They are containers – which you give a name** – that hold data, such as text and numbers. To create a variable in UiPath Studio, you will click the Variables tab, which is at the bottom of the Main screen. Select “Create variable” and then enter a name.

Boolean: This has only two values – that is, true and false. This is usually for loops and if/then/else statements.

Int32: This variable can only hold integers, which means there are no decimal points.

String: This is text data, such as contact information, articles, etc.

Object: This is a custom-built data type, which may include a blend of other variable types. For example, you could create an object that holds contact information.

System.Data.DataTable: This is to handle large datasets. This is actually common for RPA since it deals with such things as Excel spreadsheets.

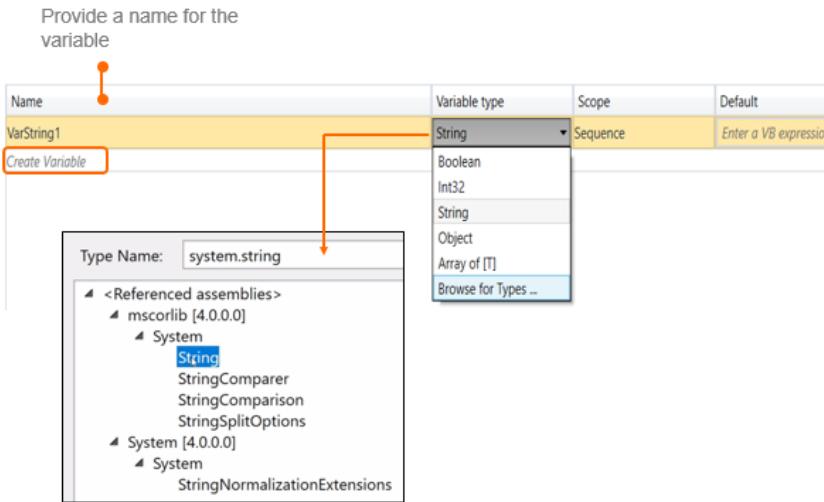
Array of [T]: An array is a string of values. You can use loops to manipulate this type of data.

Browse for Types: This will open a new menu that provides a large assortment of other unique variable types. This allows you to access the .Net framework, which makes it possible to access deeper into your computer’s system. Just some of the types include decimal, date, and password.

Variable Initialization

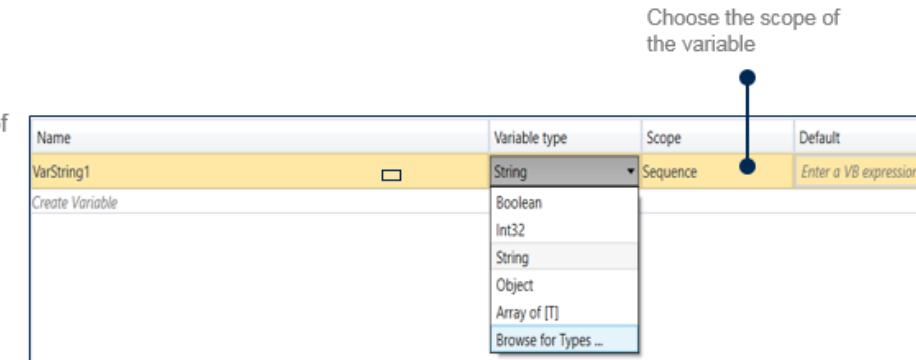
Step 1:

- Go to the Variables Panel and Click on "Create variable"
- Choose a name for the variable



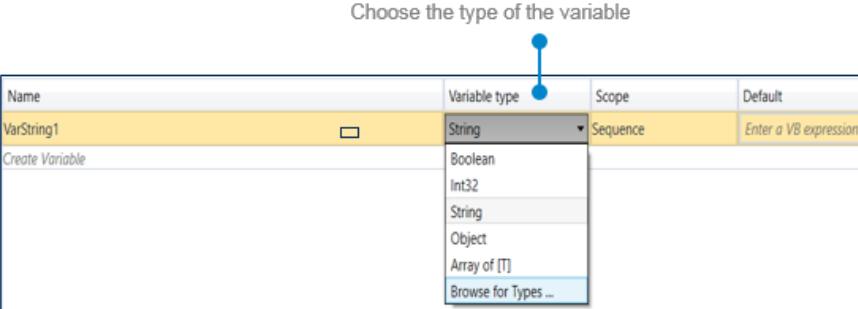
Step 3:

- Choose the scope of the variable



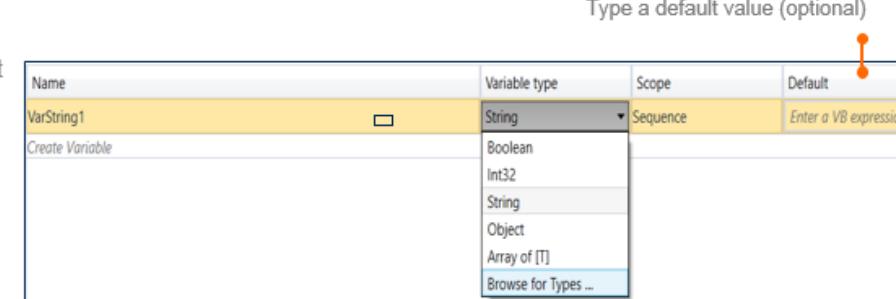
Step 2:

- Choose the type of the variable from the drop-down list

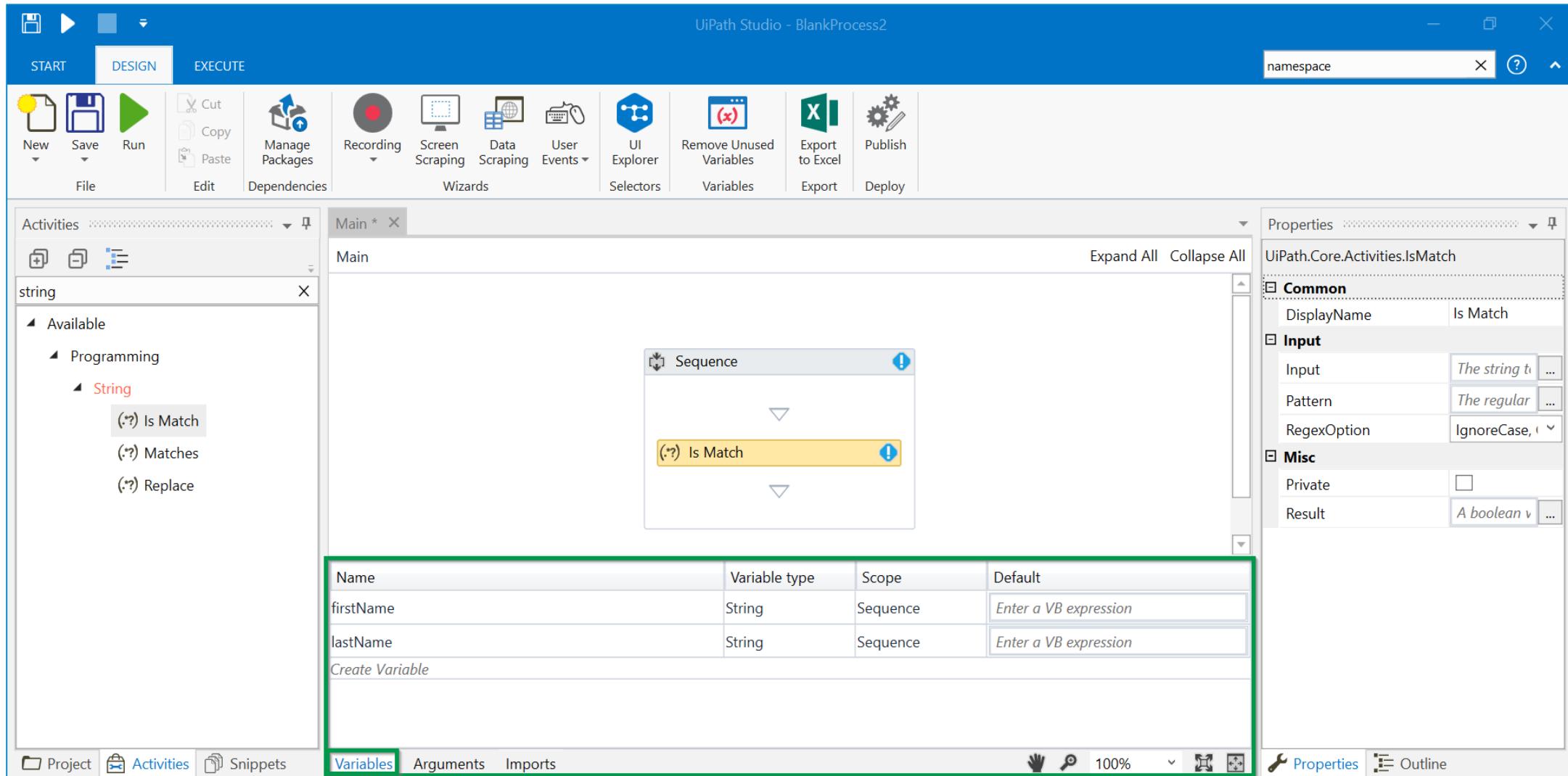


Step 4:

- Specify a default value of the variable



Variables Panel in UiPath Studio



Variables Panel in UiPath Studio (Contd.)

Name
Give a proper name to your variables

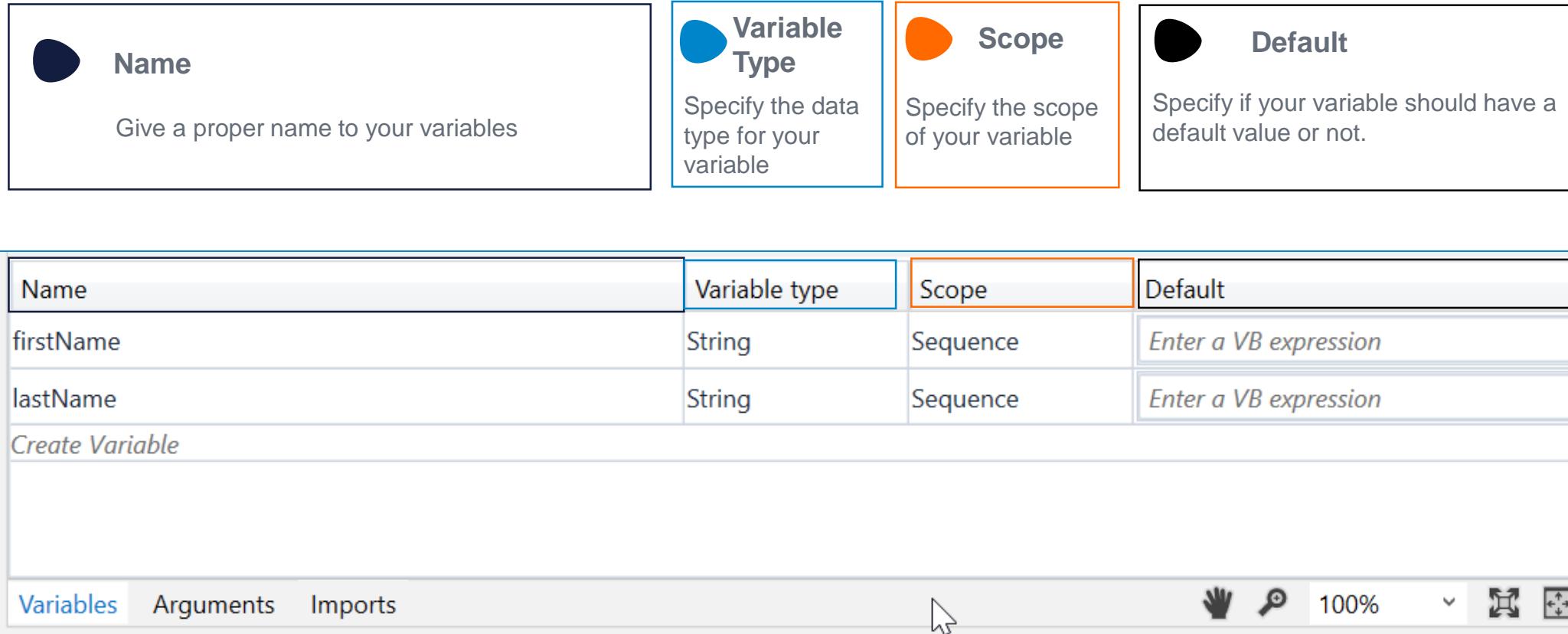
Variable Type
Specify the data type for your variable

Scope
Specify the scope of your variable

Default
Specify if your variable should have a default value or not.

Name	Variable type	Scope	Default
firstName	String	Sequence	Enter a VB expression
lastName	String	Sequence	Enter a VB expression
<i>Create Variable</i>			

Variables Arguments Imports



Variables and Arguments

- **Variables are storage containers for data that can be used later throughout the program.**

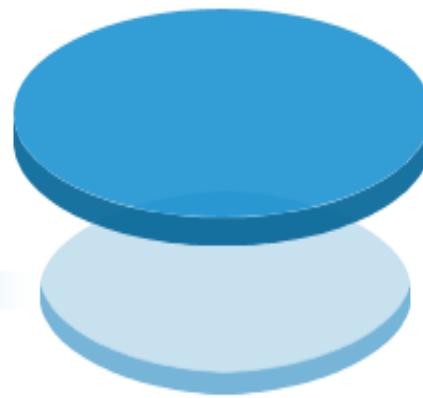
1, 2, 3
Counter
Keep track of a certain repetitive action, like clicking on an item

Hello!
Comments
Store the comments for each action item

Organized Items
Store organized items of interest to the users that clicked on them

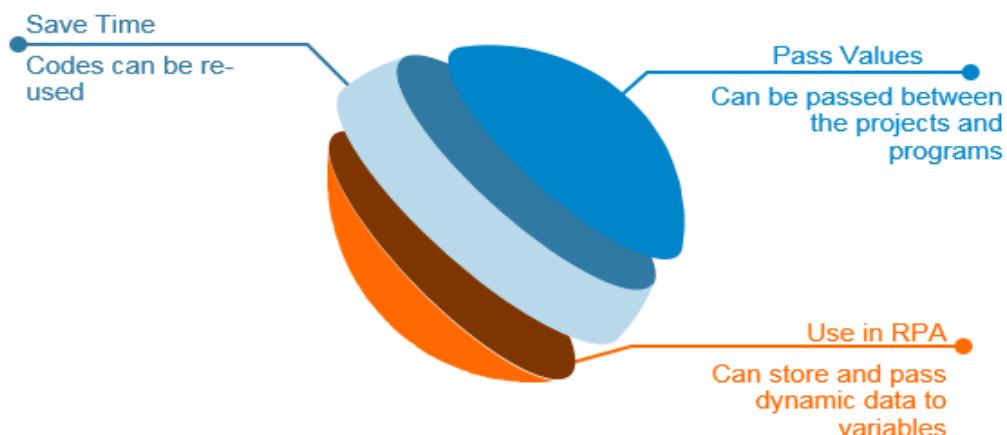


The In/Out properties within the argument tell the application where the information stored in them is supposed to go.



Arguments appear when the process that is supposed to be automated is split into multiple parts/multiple files.

- An argument is a variable than can store a value which can be used later to pass values between files.
- Arguments are used in breaking up large bits of code into smaller re-usable bits of code.



Variables

- **Variables** are storage containers for data that can be later used throughout the program. Variables are containers that store different types of information. Using variables in computer programs makes it easier to label and store data which can later be used throughout the program.

Properties of Variables

Name

Title of the information stored by the variable

Value

The expression value assigned to the variable

Lifetime

Lifetime of a variable ends when program leaves its scope

Type

Type is classification of variable based on the type of data it is intended to store.

Scope

Designate which parts of the program can see it or use it (local, global)

Location (Memory)

The place where variable is stored in the computer hardware

Variables

1, 2,
3

Counter

Keep track of a certain repetitive action, like clicking on an item



Hello!

Comments

Store the comments for each action item



Organized Items

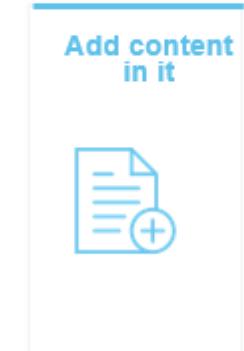
Store organized items of interest to the users that clicked on them



Some of the **actions associated with variables** are:



Create it



Add content
in it

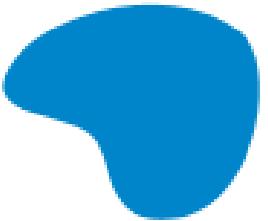


Reuse it

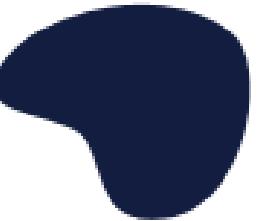


Get info out
of it

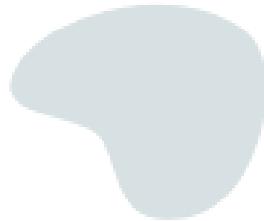
Types of Variables



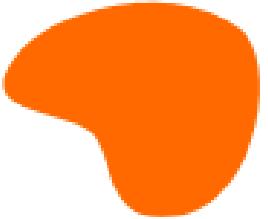
Number
Stores Numerical
Data



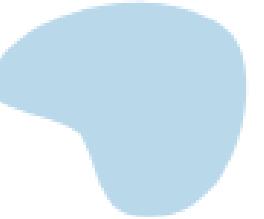
Array
Stores multiple
values



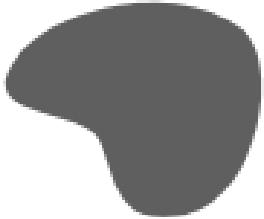
String
Stores Text



Date & Time
Stores Date and
Time



Boolean
Stores True or False



DataTable
It store the
information

Number variables are types of variables in which you can store numerical values. Depending on the programming languages, there are different numerical types that can be stored:

- Int (signed integers): 10, 299, -100, 0x69
- Long (long integers): 54354353430, -11332424D
- Float (floating point real values): 19.35, -46.55
- Complex (complex numbers): .874B

Array variables are data structures containing groups of elements, usually of the same data type.

Example

The syntax for storing and displaying the values in an array typically looks something like this:

```
arrayname[0] = "This ";  
arrayname[1] = "is ";  
arrayname[2] = "pretty simple.";
```

String Variables are variables in which you can store any kind of text and we will not apply any kind of arithmetical operation on them.

Example:

- String firstName = Alex;
- String lastName = Jackobsen;

The date and time variable is a type of variable that enables you to store information about any date and time.

Example

```
DateTime value = new DateTime(2017, 1, 18);
```

The main usage of Date & Time variable is to store a specific date and time inside or to perform other operations with them. (Ex. Calculate how many days are left until the end of the month).

A Boolean variable has only two possible values: true or false. It is common to use Boolean variable with control statements to determine the flow of a program.

```
Boolean user = true;
```

- The Boolean data type is primarily associated with conditional statements, which allow different actions by changing control flow depending on whether a programmer-specified Boolean condition evaluates to true or false.

DataTable variables represent a type of variable that can store the information and act as a database, or a simple spreadsheet with rows and columns. In UiPath Studio, DataTable variables can be found in the Browse and Select a .Net Type window, under the System.Data namespace.

- The practical usage of data tables is to store big pieces of information and do certain operations on it, such as, filtering, searching, copying, etc. They are often used to migrate data from a database to another, extract information from a website and store it locally in a spreadsheet.

String vs Array Variables

- An array is a fixed-size sequenced collection of elements of the same base types that share a single name and can be used to represent a list of names or numbers.
- A string is similar to an array with a few exceptions. It is a sequence of characters that are represented as a single data item.

Array	String
Array is a sequential collection of elements of similar data types.	String refer to a sequence of single characters represented as a single data type.
Elements of arrays are stored contiguously in increasing memory locations.	Strings can be stored in any manner in memory locations.
An array is a special variable that can hold more than one value at a time.	Strings can hold only char data.
Arrays are mutable, the fields can be modified.	Strings are immutable, the value cannot be changed in memory once created.
The length of an array is predefined.	The size of a string is not predefined.

Variables vs. Arguments

Variables

- only used inside a single workflow file(.xaml) in your project
- Types of Variable: Boolean, Array, Integer, text., Datatable
- It is used to pass it other activities.
- You can change the variable name multiple times

Arguments

- used to pass data from one workflow file to another
- have a specific direction – In, Out, In/Out
- Type of Argument: Argument, Property, Direction, Default etc.

- While variables pass data between activities, arguments pass data between automation, enabling you to use automation time and time again. **Managing arguments is similar to the variables.**
- The key difference is the differentiator. For example, if the direction is an argument then you need to ensure the direction is a correct one.
- Apart from this, in **the In/Out properties tell the application that where the information stored in them is supposed to go.**

Variable

Name	Variable type	Scope	Default
ABC	Int32	Sequence	Enter a VB expression
XYZ	String	Sequence	Enter a VB expression

Arguments

Name	Direction	Argument type	Default value
XYZ	In	String	Enter a VB expression
ABC	Out	String	Default value not supported



Name	Direction	Argument type	Default value
In_Values	In	Int32	Enter a VB expression
Out_Total	Out	String	Default value not supported
Create Argument			
Variables Arguments Imports 100%			

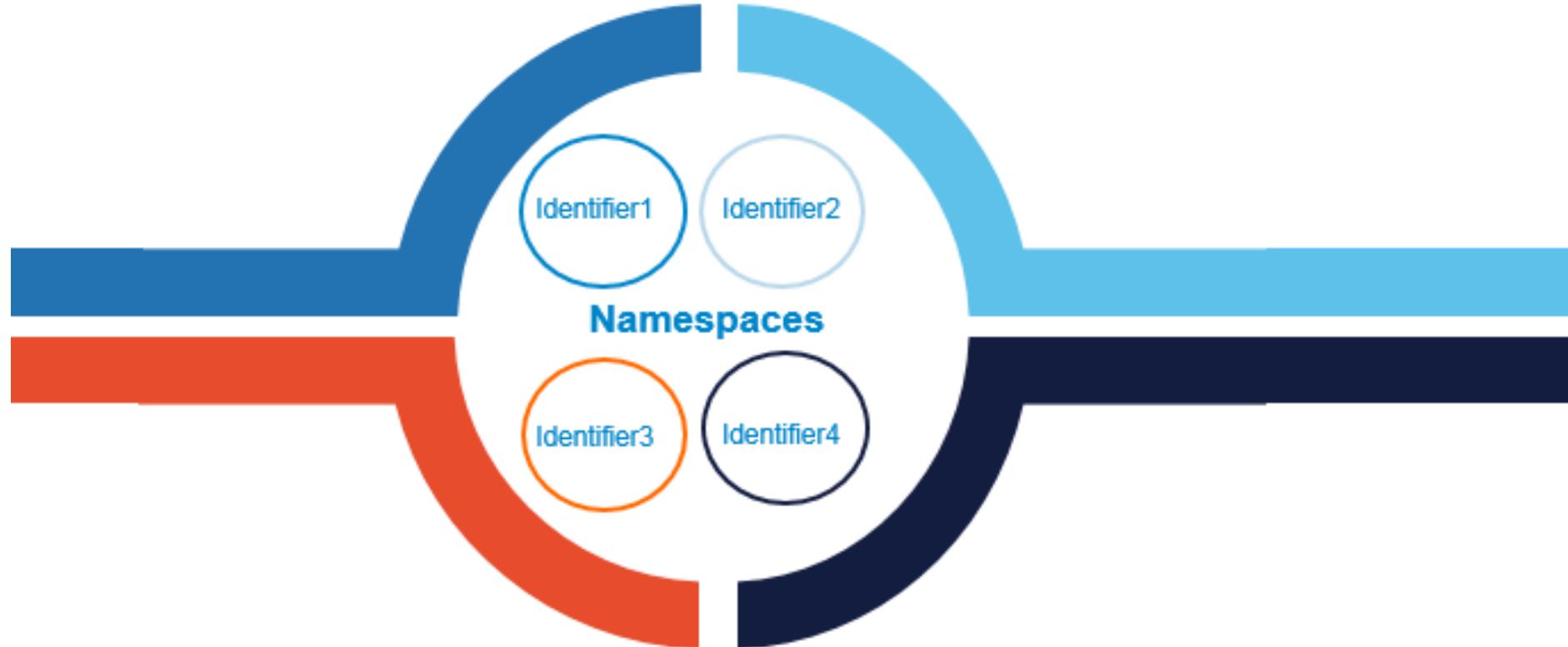
Similar to how the variables panel works, the Arguments panel is the main area where you can make changes to your arguments. This is the argument panel where you can create the argument and see the declared argument including with these:

1. Name (it define the argument name),
2. Direction (it is a set up or process that your argument is IN or OUT form)
3. Type (In it you can set your argument data type in form of Int32, Array, String and many more)
4. Default (It specify your argument value that is right or not)

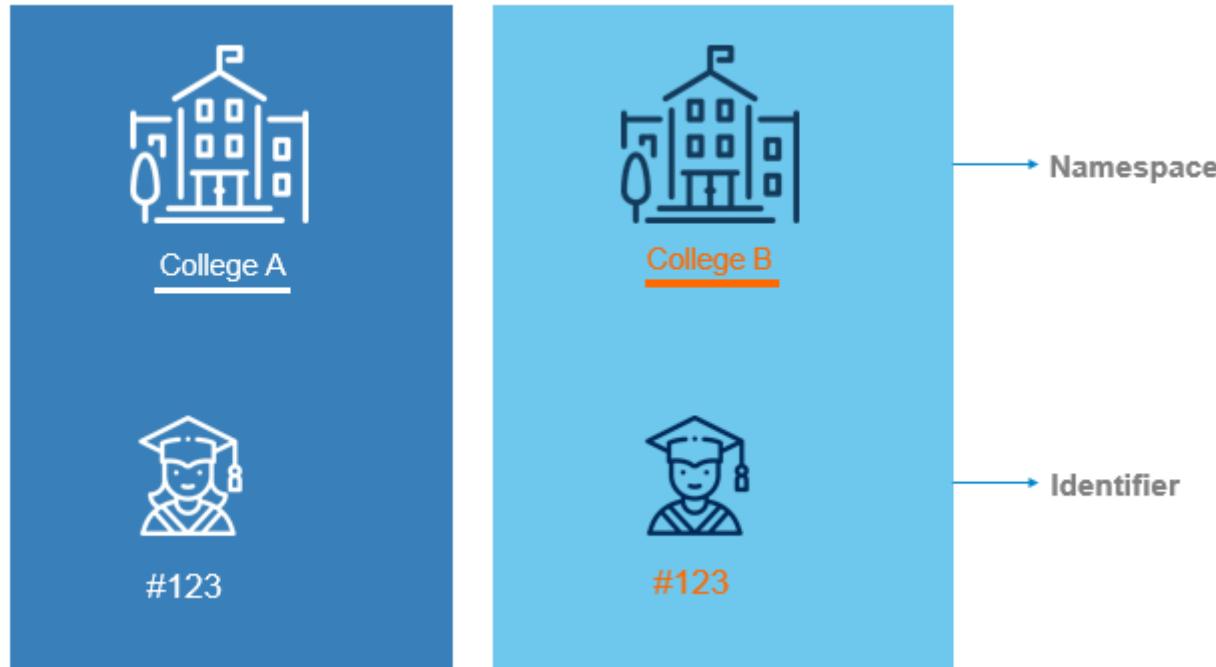
Namespaces

Namespaces are containers created to hold a logical grouping of unique names (**identifier**).

- Namespaces are used for grouping symbols and identifiers around a particular functionality.
- It is also used to avoid name collisions between multiple identifiers that share the same name.



There are two colleges, A and B and they both need to assign a unique ID to their students

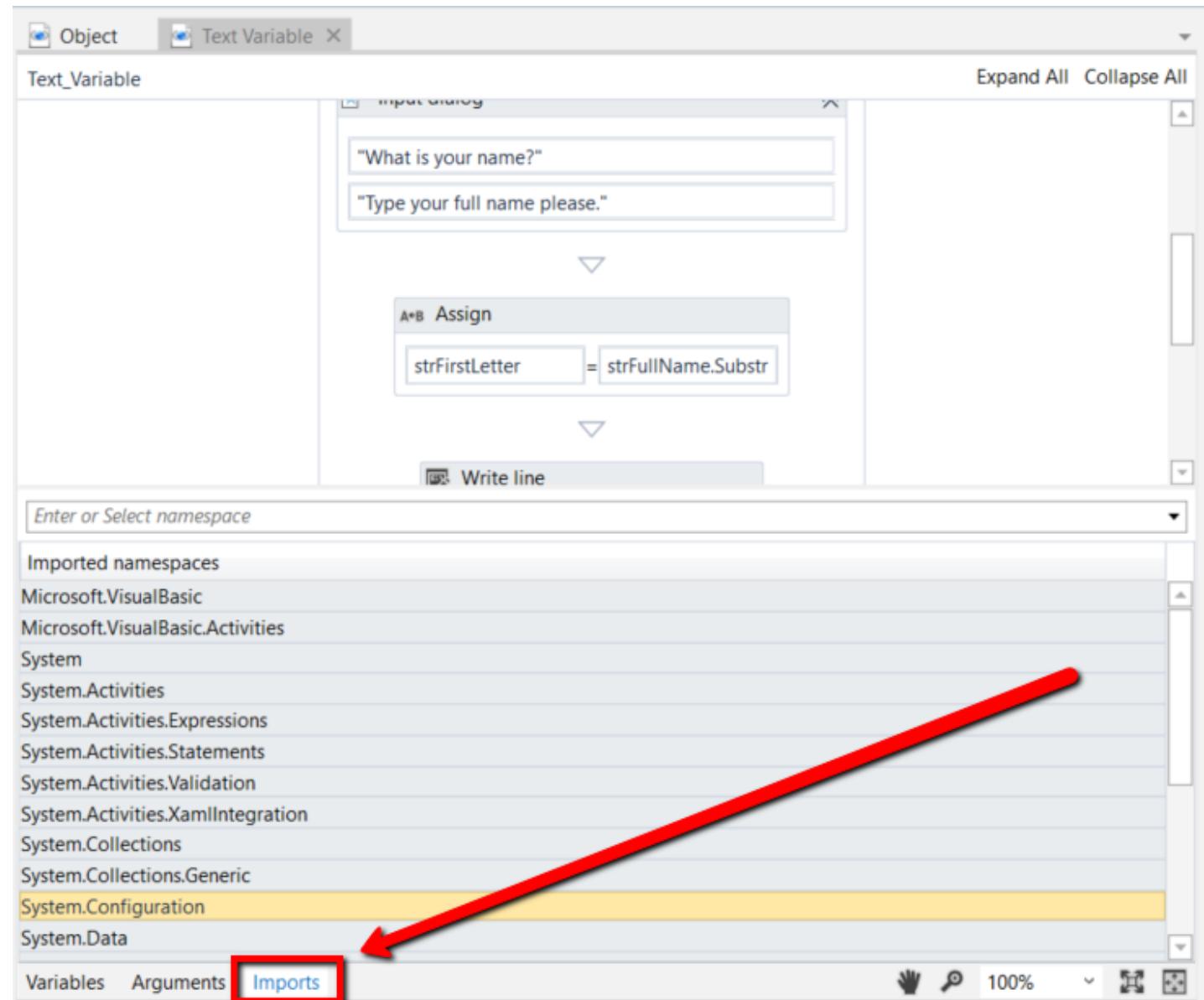


That means college A should not have two students with the same ID and neither should college B. But there's no problem for the same ID number to be used in both schools.

- If Sandy is a student in college A and Daniel is a student in college B, then it is not a problem for each of them to have the ID #123.
- In this example, the **ID number is the identifier**, and the **college serves as the namespace**.
- It does not cause problems for the same identifier to identify a different student in each namespace.

Importing New Namespace

- For example, if you have the **System.Data namespace** imported,
- you can further use DataTable, DataView, DataColumn, DataRow and other classes that are available in it, without having to always type System.Data.DataTable and so on.
- All imported namespaces are displayed in the Imports panel. Note that some namespaces are automatically imported when you browse for a .Net type variable or argument.
- To open this panel, click Imports in the Designer panel.



Control Flow in Studio: Control Flow Overview

The control flow statements

These are activities and methods that define the decisions to be made during the execution of a workflow.

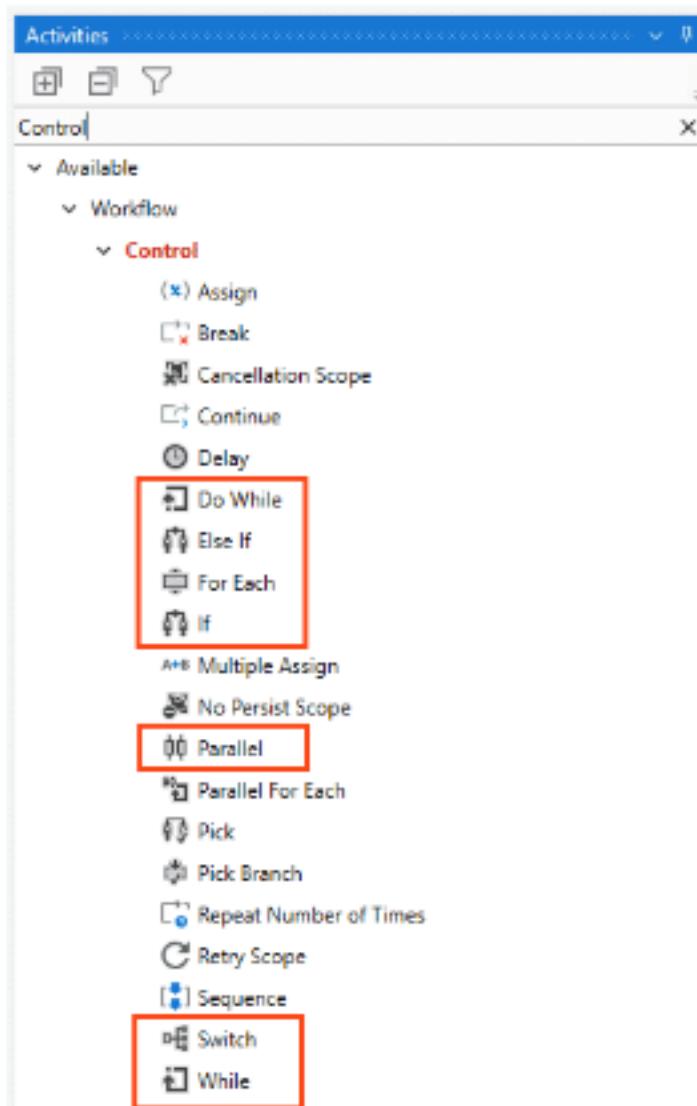
The most common control flow statements are **If**, **While**, **Do While**, **For Each**, **Switch**, and **Parallel**.

The graphic below highlights the most important control flow statements available in UiPath Studio. They are of 3 types:

- The conditional, also known as decision-making activities such as If, Else If, and Switch.
- Loops such as While, Do While, and For Each.
- Parallel Activity that executes child activities asynchronously, in parallel.

What is the importance of control flow?

- 1 Control flow takes care of the order in which the actions are performed in automation.
- 2 Activities like If/Else If, For Each, enable us to define rules and automate conditional statements within the project.
- 3 Loops enable us to run a part of the automation a specific number of times until a condition is met, or indefinitely.



Control Flow Statements in UiPath



Assign



Delay



Do While



For Each



While



Switch



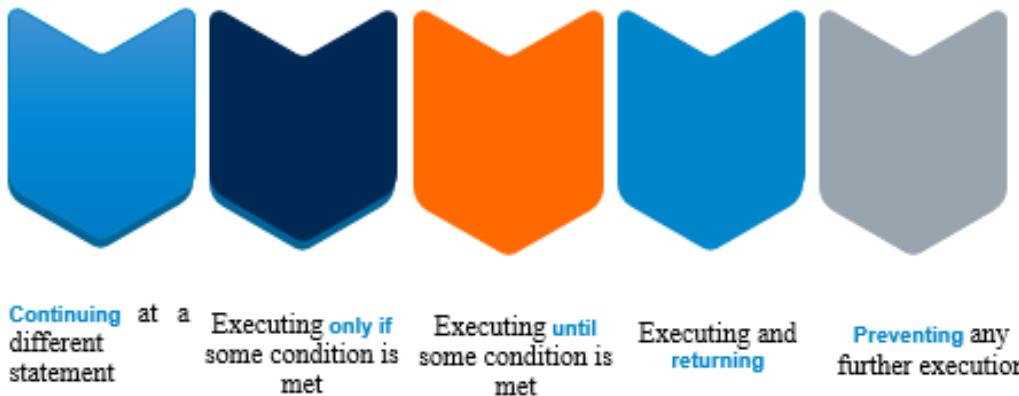
If



Break

Control Flow Activity:

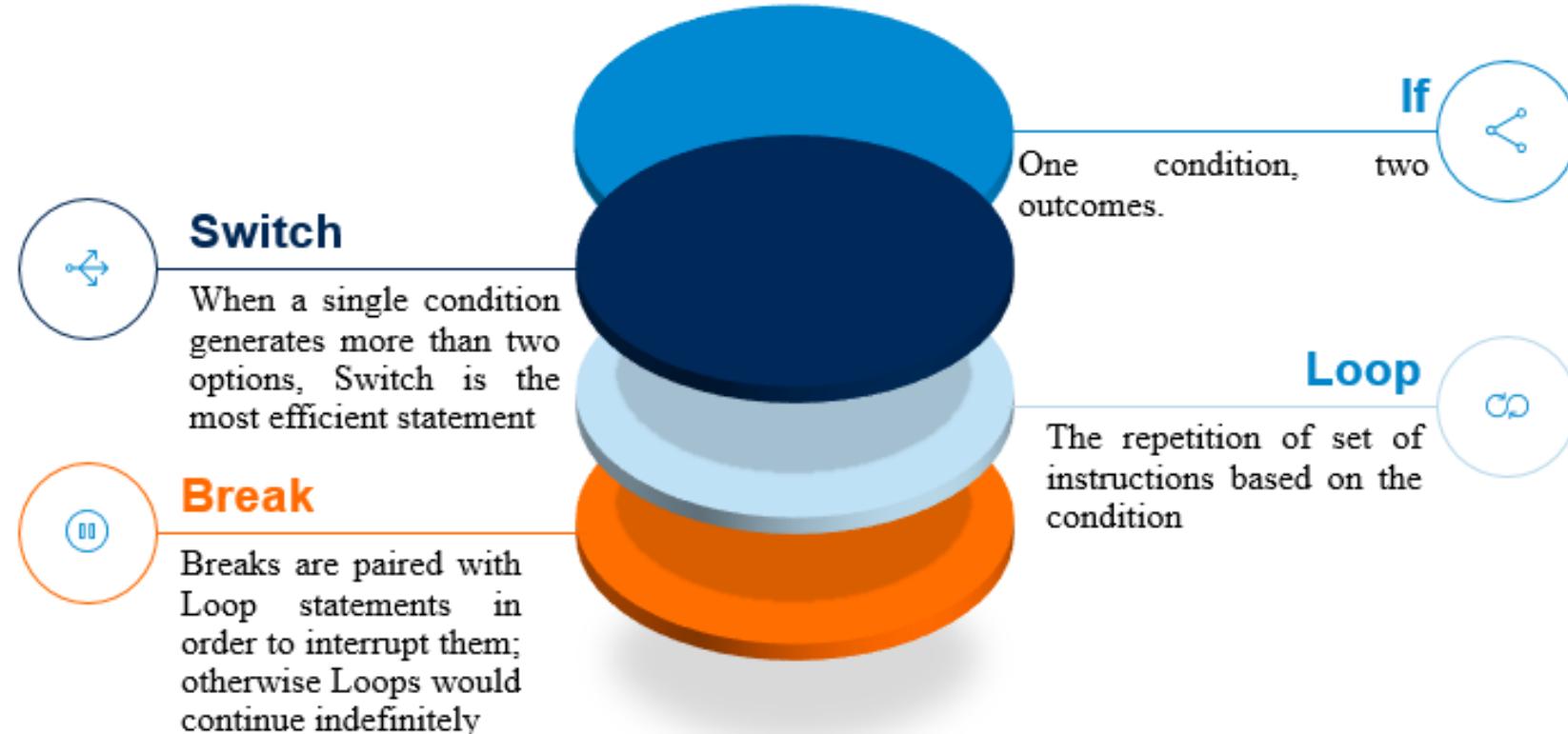
- The order in which individual statements, instructions or function calls are executed or evaluated in a software project. Control flow statements can be categorized by their effect



Control flow statements can be categorized by their effect:

- Continuing at a different statement (**unconditional branch or jump**)
- Executing a set of statements only if some condition is met (**choice - i.e., conditional branch**)
- Executing a set of statements zero or more times, until some condition is met (i.e., **loop** - the same as conditional branch)
- Executing a set of distant statements, after which the flow of control usually returns (**subroutines, coroutines, and continuations**)
- Stopping the program by preventing any further execution (**unconditional halt**)

Basic Control Statements



- **If:** the decision point with 2 branches
- **Switch:** the decision point with more than 2 branches
- **Loop:** the repetition of a set of instructions, based on a condition
- **Break:** the interruption of a loop, also based on a condition

The If Statement

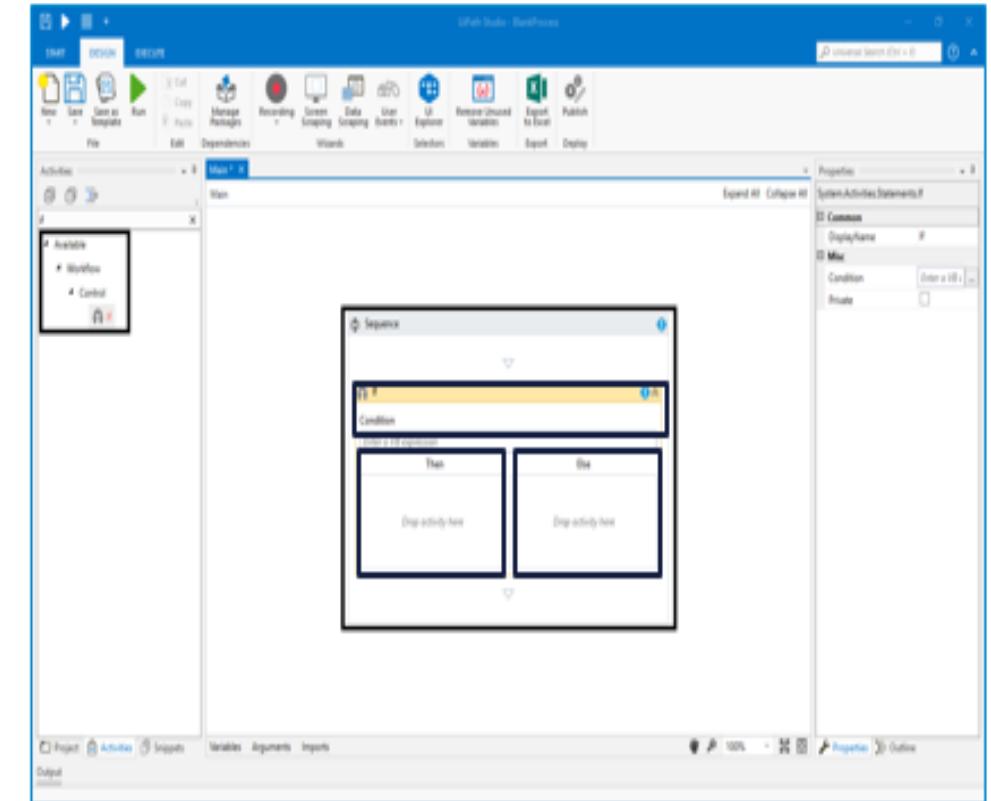
- The basic concept of If statement is a method of **two activity (Then and Else)** which contain two condition and one statement.

- The first condition is “Then” and it executes the process when the condition is “True.”
- The second is “Else” and it is executed when the condition is “false.” Apart from this, the Condition statement takes the expression or variable declaration process executed in “Then and Else statement.” Hence, the If statements are controlled by conditions.

▪ **Condition:** It contains Boolean and argument expression that is executed in the “Then and Else” Statement.

▪ **Then:** If the condition is true then it comprises the data or activities.

▪ **Else:** If the condition is False then it comprises the data or activities.

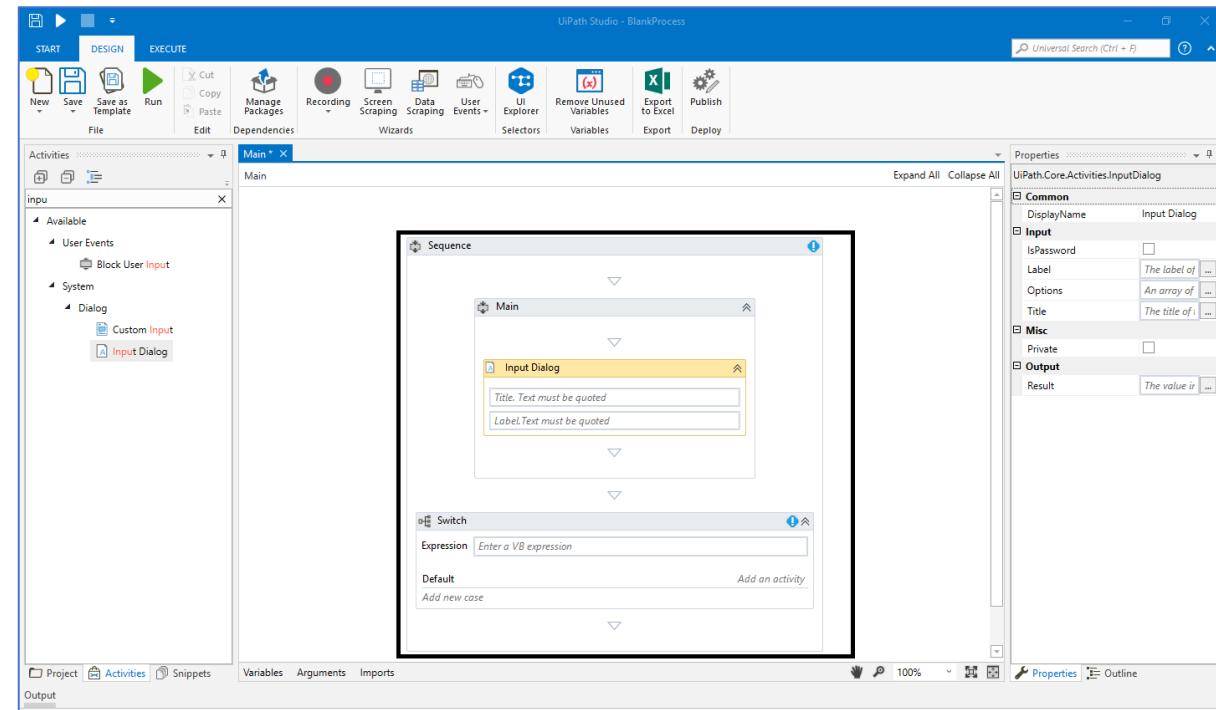


The Switch Statement

The Switch statement allows **one value out of multiple values** by specified expression.

- The Switch statement is allowing the one value out of multiple values by specified expression where **it processes only integer argument values**. You can change the properties also in it by the “TypeArgument” list.
- It is used in UiPath to categorize the number of processes. The use of the Switch statement is considered superior to an equivalent series of If statements because it is:
 - Easier to debug
 - Easier to read
 - Statement fixed in-depth

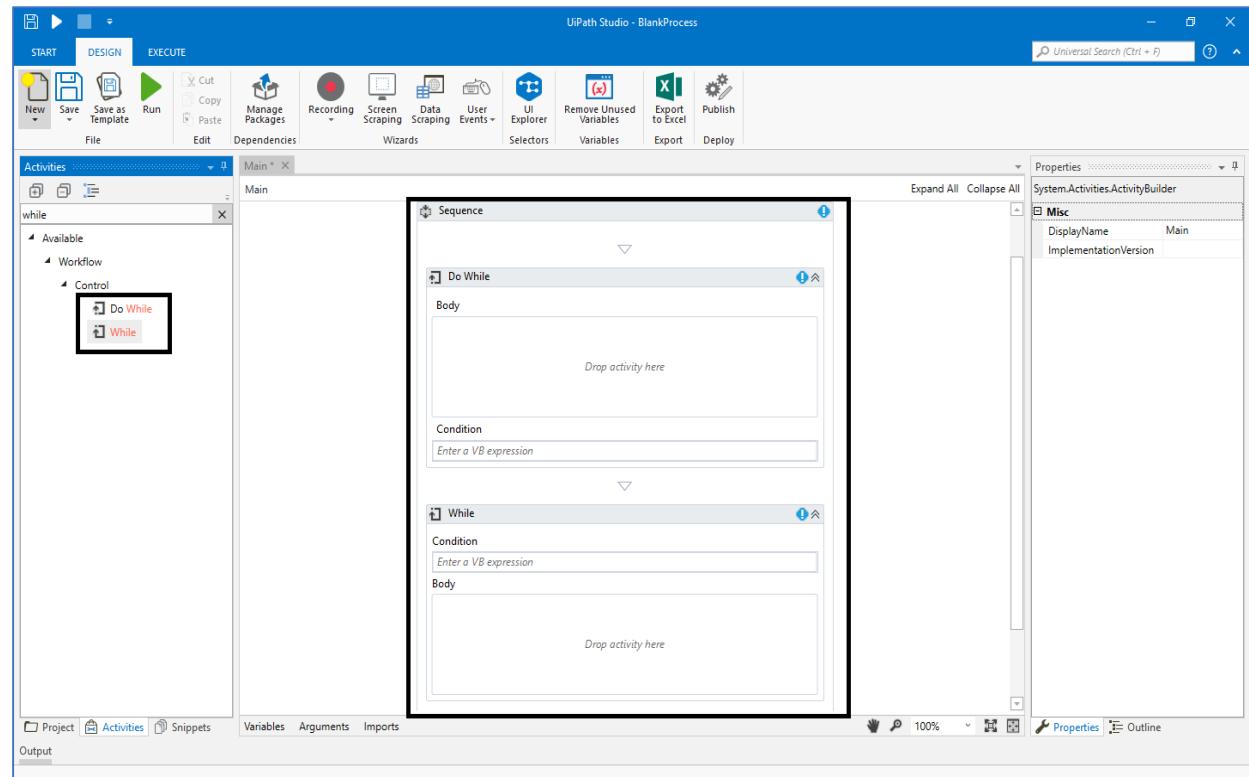
- **Condition:** It processes only integer argument values.
- **Use:** It is useful in the number of processes.
- **Types of Switch statement:** Structured and Unstructured



The Loop Statement

Loop is the structure that executes a repetitive set of operations with these low error activities.

- Loop is a structure that is used to automate repetitive tasks in UiPath. It executes sets of operations repetitively, faster, with low error rates through loops. It executes the process within the loop and the essential element is the control in the loop. It could be:
- **Count-controlled:** In such a Loop, the number of execution of the loop is predefined.
- **Indefinite Case:** Such a Loop executes for an unlimited number of times.
- **Conditional:** This is widely used in programming. It contains a validation mechanism and executes when / until a certain condition is met.

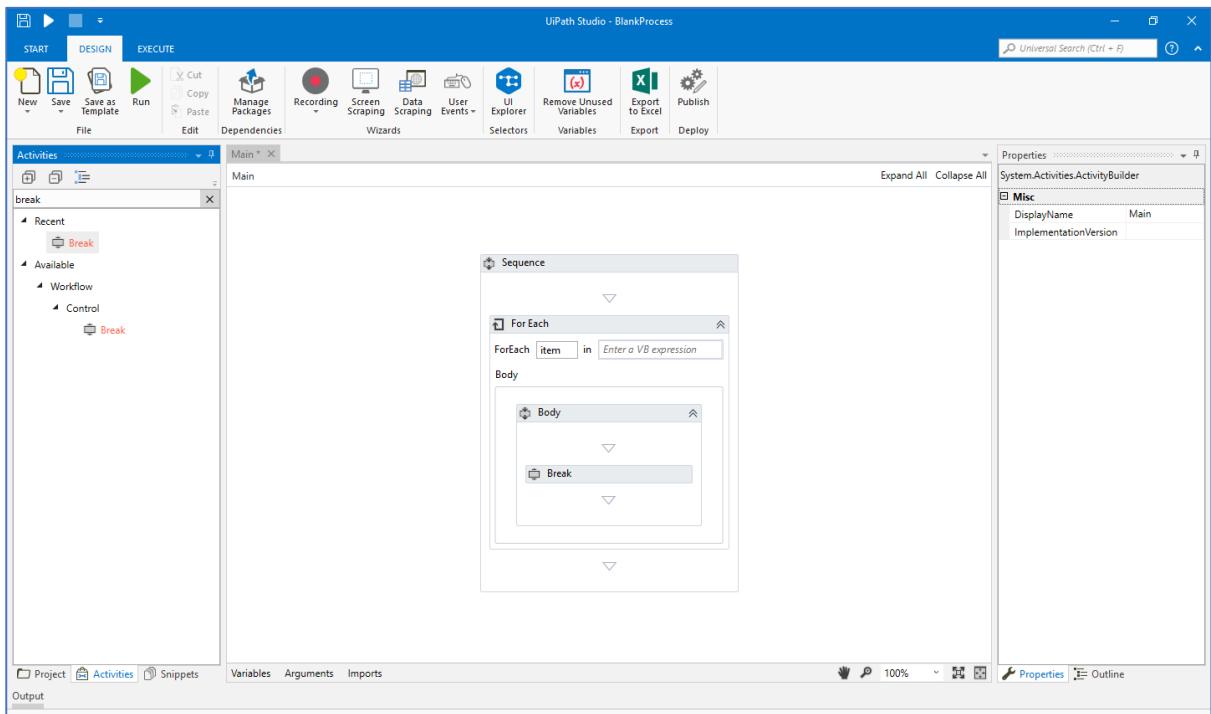


The Loop Statement is of two types:

- **Do While:** In the Execution process, this activity runs when the condition is true.
- **While:** In the Execution process, this activity runs when the condition is False.

The Break Statement

- It is the process in the UiPath Studio which allows to break an activity on the chosen or starting point.
 - The Break statement allows you to break an activity on the chosen or starting point and enables the process to continue in the next activity.
 - When you build a project with the help of this statement, it exits each activity and continues the workflow process activity.
 - In project development, this statement is used for loop termination and transfer the statement in the “Switch or Loop statement.”
 - For example, to end a branch and move to a different sequence. The most common use is in relation with a Loop, where it is used to interrupt it and continue the execution outside it.



- **Condition:** It exits each activity and continues the workflow process activity.
- **Switch or Loop statement:** Break statement used for loop termination and transfer the statement in the “Switch or Loop statement”.
- **Use:** It is used in relation with a Loop, to interrupt it and continue the execution outside it.

Control Flow Statements in UiPath



Assign



Delay



Do While



For Each



While



Switch



If



Break

- There are basically eight different types of control flow statements that use in UiPath.
- Some are generic control flow statements like If and Switch where as others are specific like Do While, For Each and While are loops.
- Break in UiPath is not the generic break that we use in programming, but it serves the same purpose.

Assign

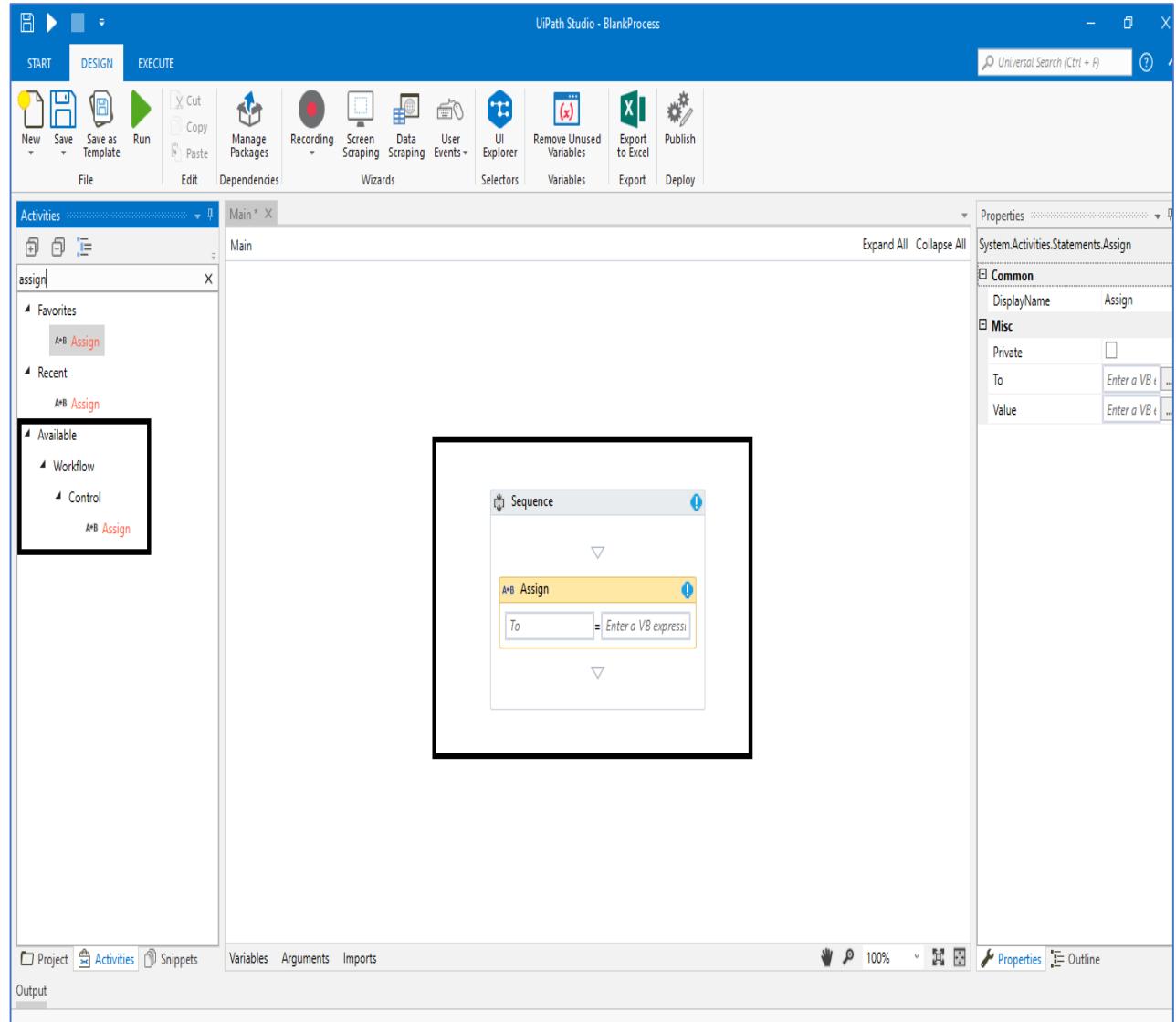
- **The Assign statement allocates a value to a variable or argument.**

What it can be used for?

- Increment the value of a variable in a loop
- Sum up two or more variables and assign the result to a different variable
- Assign values to an array

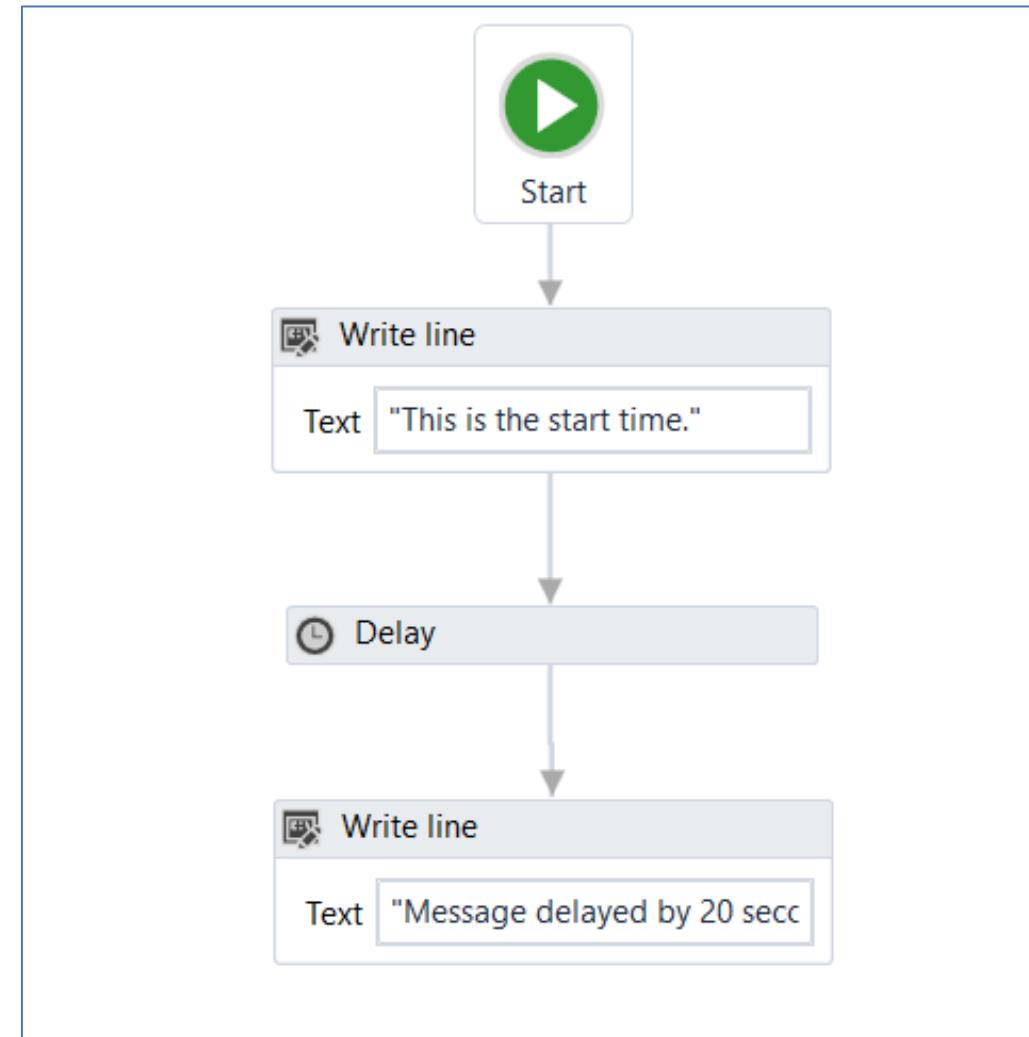
Assign is used to:

- **Increase the value of a variable**(this is very useful while using a limited loop)
- **Perform the mathematical calculations** or operations and assign the result or outcome to a new variable.
- **Allocate value to an entire Array**



Delay

- **The Delay statement pauses an automation for a period of time.**
 - The purpose of the Delay statement is to **pause an automation for a given period of time**. It's the simplest way:
 - **To address a common issue in programming**, and especially in automation – the loading time of a specific application or website
 - As a generic approach, when two operations that need to be in a sequence are not ready at the same time
 - The concept of delay has solved many issues such as the machine latency which leads to system slowness and **when a specific application is not able to load or sync at that particular time** therefore leading to the automation throwing error or failure.



Loops: while , Do while, For Each

What are Loops?

- Control structures which repeat a set of instructions, based on a condition.
- Used to automate repetitive tasks.
- In flowcharts, they can be created by connecting a certain point in our workflow to an earlier execution point.
- In sequences, there are special activities, or containers, that repeat the action that is inside the body section, based on a condition.

The While Loop:

- Checks the condition first, and if it is true, executes the set of actions in the body.

The Do While Loop:

- Executes the actions, then checks the condition, and, if it is true, then executes the activities again.

How do you exit a loop?

Loops are fun, but you should know how to stop the ride at some point. There are multiple ways to exit a loop:

- The **While** and **Do While** loops will exit when upon checking, the condition is no longer true.
- The **For Each** loop will exit when it has finished processing every item in the input collection.
- The **Break** activity enables you to exit the current loop activity (e.g. For Each, While, or Do While) at a chosen point and continues the workflow with the activity that follows it.

Recap:

- The For Each activity:
 1. Enables us to step through arrays.
 2. Enables iteration through the data and process each piece of information individually.



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