# **Proposed System (Architecture/Frameworks)**

To enhance the performance and scalability of our data analysis tool, we proposed the implementation of cloud computing. We chose to use Amazon Web Services (AWS), a popular cloud computing platform, for our project. The proposed system architecture/framework consists of the following components:

1. Front-end: The front-end of our data analysis tool is built using HTML, CSS, and JavaScript. Users can access the tool through a web browser.
2. Back-end: The back-end of our tool is built using Python and Flask, a micro web framework. It handles user requests, data processing, and communication with other components.
3. Cloud Computing: We used various AWS services to implement cloud computing in our project. The main services we utilized are Amazon S3 for storing large datasets, Amazon EC2 for virtual machine instances, and Amazon RDS for the database.

**Hardware Requirements:**

A computer with internet connectivity to access the AWS cloud services.

Sufficient storage capacity on Amazon S3 to store large datasets.

**Software Requirements:**

Operating System: Windows, Linux, or macOS

Web Browser: Chrome, Firefox, Safari, or any modern web browser

Python: Version 3.x

Flask: Python micro web framework

AWS CLI: Command-line interface to interact with AWS services

The "POGIL Data Analysis" project utilizes a cloud-based architecture that leverages various cloud computing technologies to enable scalable, efficient, and cost-effective data analysis. The proposed system architecture comprises the following components:

1. Infrastructure as a Service (IaaS): The project utilizes IaaS provided by a public cloud platform, such as Amazon Web Services (AWS) or Microsoft Azure, to host the application's virtual machines (VMs) and provide computing resources. The VMs are dynamically provisioned and de-provisioned based on the workload requirements, allowing for scalability and flexibility.
2. Platform as a Service (PaaS): The project also leverages PaaS offerings, such as AWS Elastic Beanstalk or Azure App Service, to deploy and manage the web application. The PaaS platform abstracts the underlying infrastructure and provides a scalable and managed environment for running the application, eliminating the need for managing the underlying infrastructure.
3. Database as a Service (DBaaS): The project uses DBaaS offerings, such as AWS RDS or Azure Database, to store and manage the application's data. The DBaaS platform provides scalable and managed database services, eliminating the need for manual database administration tasks and ensuring high availability and performance.
4. Storage as a Service: The project utilizes cloud-based storage services, such as AWS S3 or Azure Blob Storage, for storing and managing large datasets used in data analysis. The storage services provide scalable, durable, and cost-effective storage solutions, allowing for efficient data storage and retrieval.
5. Security as a Service: The project leverages cloud-based security services, such as AWS Identity and Access Management (IAM) or Azure Active Directory, to manage access controls, authentication, and authorization. These services provide robust security features and ensure secure access to the application and data.
6. Custom Data Analysis Application: The "POGIL Data Analysis" project includes a custom-built web application that is deployed on the cloud platform. The application leverages the computing resources, managed environment, and database services provided by the cloud platform to perform various data analysis tasks, such as data preprocessing, feature extraction, machine learning algorithms, and result visualization.
7. User Interface: The project includes a web-based user interface that allows users to interact with the data analysis application, submit analysis tasks, and view the results. The user interface provides an intuitive and user-friendly experience for users to input their requirements and visualize the analysis outcomes.

The proposed system architecture for the "POGIL Data Analysis" project utilizes a combination of IaaS, PaaS, DBaaS, Storage as a Service, and Security as a Service offering, along with a custom data analysis application and user interface, to enable efficient and scalable data analysis in the cloud. This architecture leverages the advantages of cloud computing, such as scalability, flexibility, managed services, and cost-effectiveness, to transform the data analysis capabilities of the application and provide an improved user experience.