



## UNLOCK DEEPER CLINICAL INSIGHTS: A UNIFIED APPROACH TO DATA ANALYSIS WITH SAS, R, AND PYTHON

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# Introduction

Finding a novel approach for integrating the SAS-language, R and Python into unified programs for streamlined clinical trial analysis.

In the rapidly evolving landscape of clinical trials, how can we overcome the limitations of single-language analysis?



## Challenges

- Complex datasets
- Diverse analytical needs
- Reproducibility requirements



# SAS-Language - The Regulatory Backbone

## Strengths:

- Robust Data Management: Proven reliability for handling complex datasets.
- Regulatory Compliance: de facto choice for meeting stringent industry standards.



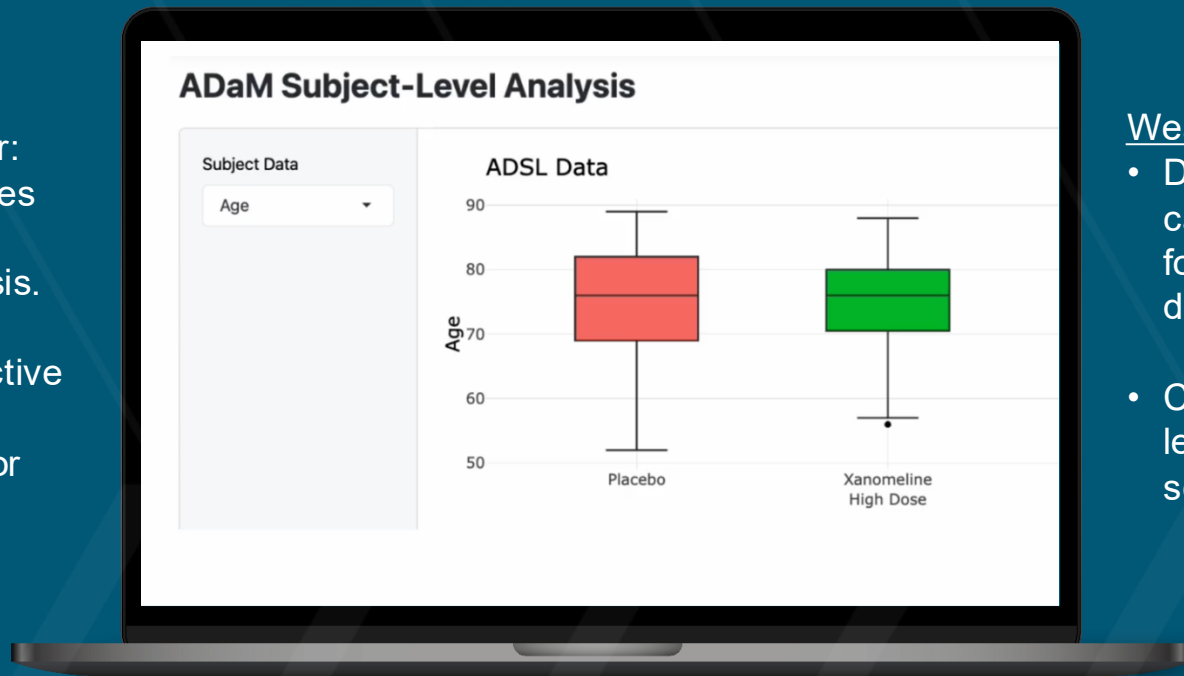
## Weaknesses:

- Limited flexibility in modern statistical and machine learning applications.
- Can be less efficient for rapid prototyping and exploratory data analysis.

# R - The Statistical Powerhouse

## Strengths:

- Statistical Power: Extensive libraries for advanced statistical analysis.
- Shiny for Interactive Visualizations: Dynamic tools for exploring data.



## Weaknesses:

- Data management can be less robust for very large datasets.
- Can have a steeper learning curve for some users.

# Python: The Data Science Frontier

## Strengths:

- Machine Learning:  
Powerful libraries for predictive modeling and AI.
- Data Science Ecosystem:  
Versatile tools for data manipulation and analysis.



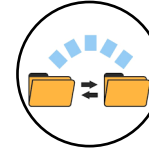
## Weaknesses:

- Regulatory compliance functionality may require custom development.
- Statistical depth is different than R and requires different libraries.

## Limitations of isolation



Redundant Coding:  
Duplication of effort  
across multiple  
languages.



Data Transfer  
Bottlenecks:  
Inefficient movement  
of data between  
platforms.



Difficulty in Leveraging  
Diverse Expertise:  
Siloed knowledge and  
skills.





## The Synergy of Integration

By combining the strengths of the SAS-Language, R and Python, we unlock a powerful synergy that enhances efficiency, flexibility, and innovation in clinical trial analysis.

### Benefits

|                       |                                  |                          |
|-----------------------|----------------------------------|--------------------------|
| Streamlined workflows | Enhanced analytical capabilities | Improved reproducibility |
|-----------------------|----------------------------------|--------------------------|

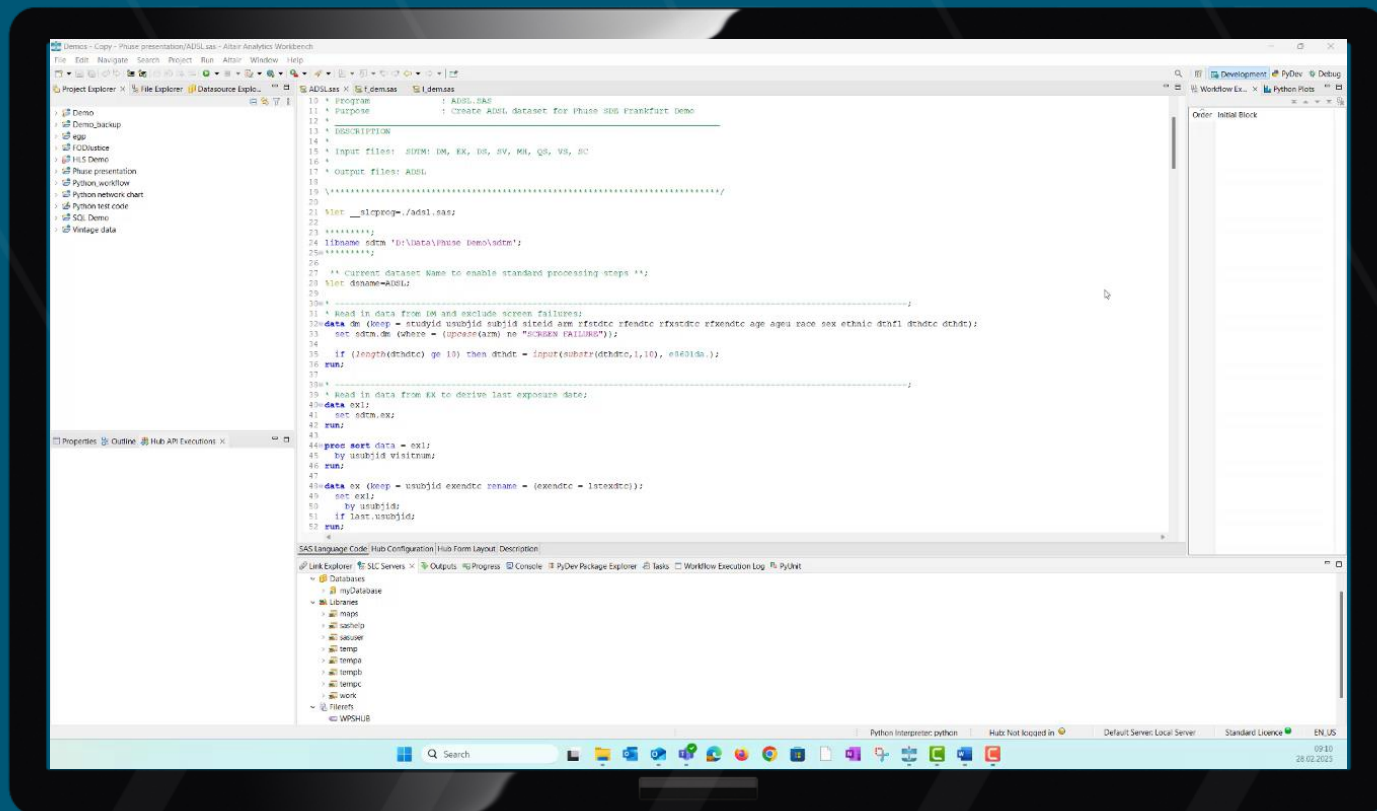
# BUILDING UNIFIED CLINICAL TRIAL PROGRAMS

## The Core Concept: Language Harmony

- Create single programs that leverage the strengths of the SAS-language, R and Python.
- This approach eliminates the need for separate scripts and manual data transfers.
- The goal is to create a unified workflow for data management, analysis and visualisation.

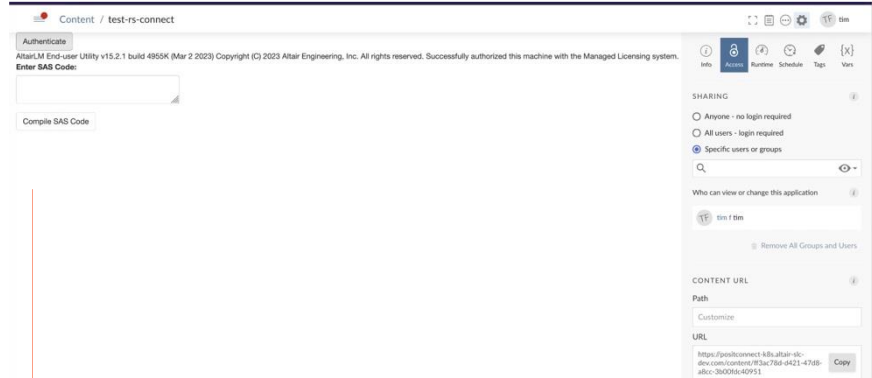


# Demo





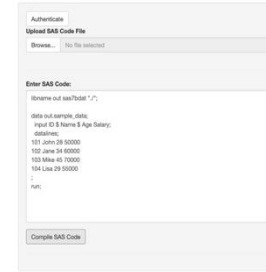
## How could R Shiny be incorporated?



### Front end to enable authorized coding in SLC

A package can be implemented to integrate SLC with R Shiny, providing code submission capabilities within the R Shiny environment.

### SAS Code IDE



### Dataset

| ID  | Name | Age   | Salary   |
|-----|------|-------|----------|
| 101 | John | 28.00 | 50000.00 |
| 102 | Jane | 34.00 | 60000.00 |
| 103 | Mike | 45.00 | 70000.00 |
| 104 | Lisa | 29.00 | 55000.00 |

### Log

```

1 Altair SLC 10:49 Thursday, January 15, 2025

NOTE: Copyright 2002-2024 World Programming, an Altair Company
NOTE: Altair SLC 2024 105.24.40.00.000000
License: Altair Managed Licensing Server, 168 units; expiry: 2025-06-30 23:59
NOTE: This session is executing on the SLC00 platform and is running on 64 bit mode.

2
3 Libname out sas7bdat "/";
NOTE: Library not assigned as follows:
Engine:
Physical Name: /home/sas/test-rs-connect

4
5 data out.sample_data;
6 input ID $ Name $ Age Salary;
7 datalines;
8 101 John 28 50000
9 102 Jane 34 60000
10 103 Mike 45 70000
11 104 Lisa 29 55000
12 ;
13 run;

```

### Code written and results displayed in R Shiny application

Imagine writing and running code directly within R Shiny, with results and logs appearing instantly! This unlocks the potential for developers to build unique Shiny IDEs and bridge the gap between the SAS-language and R through powerful visual integrations.



## Benefits and implications: Transforming Clinical Trial Analysis

Unlocking Efficiency, Innovation and Speed

# Key Advantages

## Efficiency and Flexibility



- **Enhanced Efficiency:** Reduced coding time and faster data processing.
- **Increased Flexibility:** Seamlessly adapt to diverse analytical needs.
- **Streamlined Data Management:** Simplified data flow and manipulation.
- **Statistical Analysis and Visualisation:** Integrated tools for comprehensive insights.

## Reproducibility and Innovation:



- **Improved Reproducibility:** Consistent and transparent analysis workflows.
- **Promotion of Innovation:** Fosters the development of new analytical techniques.
- Allows for the **best tool to be used** for each task.

## Broader implications

### Impact on Clinical Trial Workflows

- Optimised Workflows: Reduces bottlenecks and accelerates timelines.
- Improved Collaboration: Facilitates communication between statisticians, programmers, and researchers.
- Standardisation: Promotes consistent and reliable analysis practices.

### Future Directions and Drug Development

- Future Directions: Continued development of integrated tools and methodologies.
- Research and Development: Application to other areas of biomedical research.



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