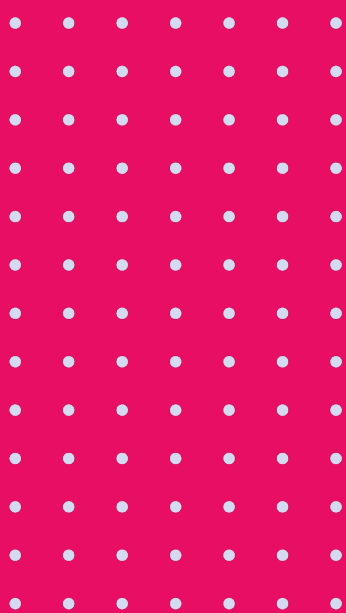




Language Diversity

Callum Charalambides

5/30/23

Agenda

Introduction

SAS and R

Why use other languages?

Examples and uses

Summary

Q&A

Introduction



Programmer II at Veramed



Almost 2 years in the industry



Worked in multiple therapeutic areas



Degree in Computer Science



Used a variety of programming languages to assist my work





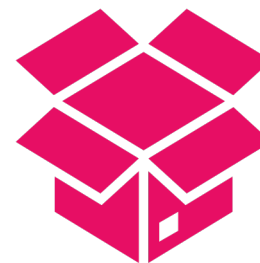
Ability to handle large
Databases



Open-source



Easy to learn



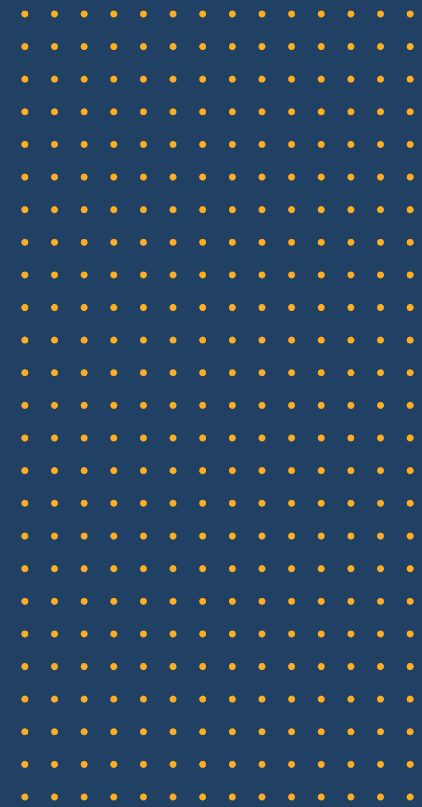
Many packages
available



Amazing statistical
capabilities



Constantly growing



Why use other Languages?

Why use other Languages?



Increased Learning
Efficiency



Versatility and
flexibility



Enhanced Problem-
Solving Skills



Personal and
Professional Growth



Deep Understanding
of fundamentals

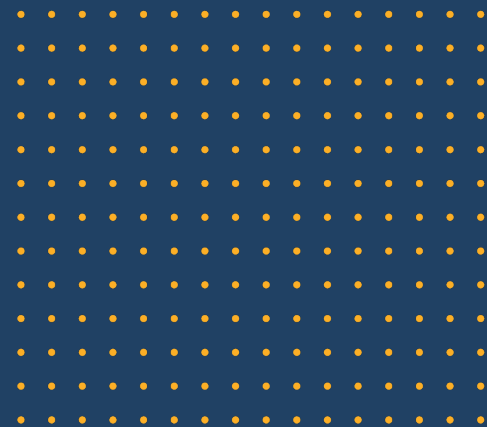


Increased Problem
Domain Coverage



Better Understanding
of Language-Specific
concepts

Examples and Uses



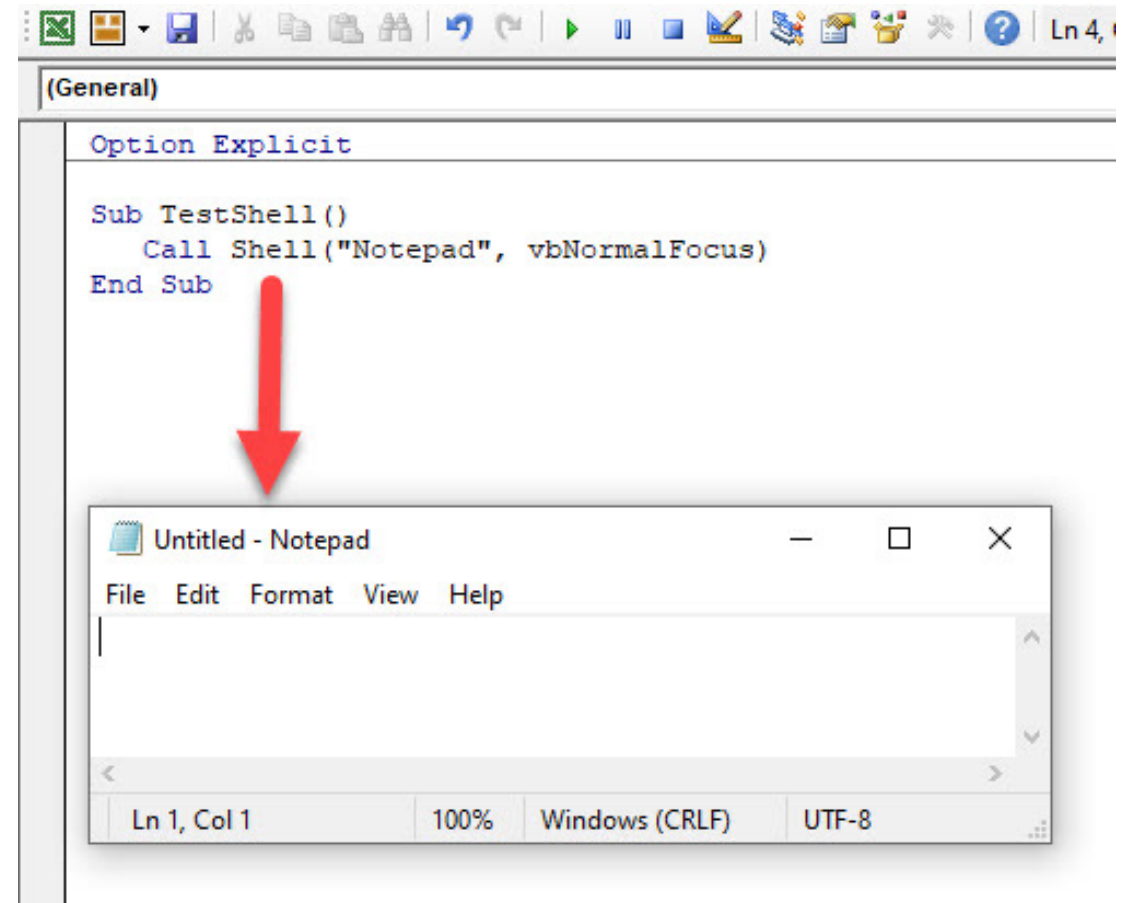
Visual Basic for Application (VBA)

- VBA is Microsoft's programming language for Windows operating systems
- Runs as an internal programming language in Microsoft Office applications such as Excel, Word, Powerpoint etc...
- With VBA you can create macros to automate repetitive word- and data-processing functions, and generate custom forms, graphs, and reports.



Visual Basic for Application (VBA)

- Call Shell("notepad", vbNormalFocus)



Visual Basic for Application (VBA)

```
Public Sub RunProd(program As String)
```

```
Dim sysin As String
Dim log As String
Dim shellCall As String
Dim s2 As String
Dim doesFileExist As Boolean
```

```
sysin = codePath & "\" & program & ".sas"
log = logPath & "\" & program & ".log"
```

```
doesFileExist = dirCheck(sysin)
```

```
If doesFileExist = False Then
    MsgBox "Can't find program"
```

```
Else
```

```
    'Constructing the String we will call with Shell to run SAS program;
```

```
    s2 = sysin & " -ICON -LOG " & log
```

```
    'Shell shellCall
```

```
    Shell "E:\SAS\SASHome\SASFoundation\9.4\sas.exe -CONFIG E:\SAS\SASHome\SASFoundation\9.4\nls\en\sasv9
```

```
End If
```

```
GetDateTime
```

```
End Sub
```

Javascript (JS)

- Open-source programming language
- At the core of the World Wide Web alongside HTML and CSS
- 98% of websites use JS
- Usable in Adobe Acrobat!



Javascript (JS)

```
/* Mark misspelled words with squiggle */  
var chWord, numWords;  
for (var i = 0; i < this.numPages; i++)  
{  
    numWords = this.getPageNumWords(i);  
    for (var j = 0; j < numWords; j++) {  
        ckWord = spell.checkWord(this.getPageNthWord(i,j))  
        if (ckWord != null) {  
            this.addAnnot({  
                page: i,  
                type: "Squiggly",  
                quads: this.getPageNthWordQuads(i,j),  
                author: "A.C.Acrobat",  
                contents: ckWord.toString()  
            });  
        }  
    }  
}
```

Javascript (JS)

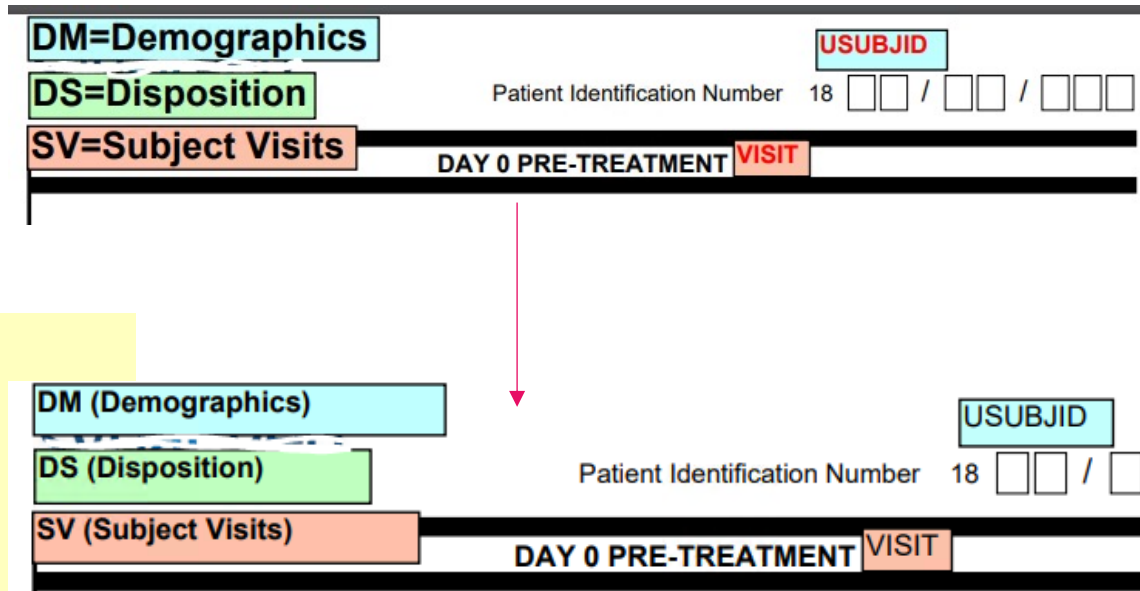
```
/* Create bookmarks for each page in the document */  
var root = this.bookmarkRoot;  
try {  
  
    for (var i = 0; i < this.numPages; i++)  
    {  
        root.createChild("Page " + (i+1), "this.pageNum=" + i, i);  
    }  
}  
catch(e)  
{  
    app.alert("Processing error: "+e)
```

```

/* Update aCRF */
this.syncAnnotScan();
var annots = this.getAnnots();
if (annots!=null) {
  for (var i in annots) {
    var annot = annots[i];
    if (annot.type=="FreeText") {
      var annotContents = annot.richContents;
      for (var j in annotContents) {
        annotContents[j].textFont = 'arial';
        annotContents[j].textColor = color.black;
        annotContents[j].textSize = 12;

        if (annotContents[j].text == 'DM=Demographics') {
          annotContents[j].text = 'DM (Demographics)';
          annotContents[j].textStyle = "bold";
        } else if (annotContents[j].text == 'DS=Disposition') {
          annotContents[j].text = 'DS (Disposition)';
          annotContents[j].textStyle = "bold";
        } else if (annotContents[j].text == 'SV=Subject Visits') {
          annotContents[j].text = 'SV (Subject Visits)';
          annotContents[j].textStyle = "bold";
        } else {
          annotContents[j].fontWeight = 400;
        }
      }
    }
  }
}

```



The diagram illustrates the transformation of aCRF labels. On the left, a vertical stack of labels is shown: **DM=Demographics** (light blue), **DS=Disposition** (light green), and **SV=Subject Visits** (light orange). These labels are associated with a form containing a **USUBJID** field and a **Patient Identification Number** field (18 [] [] / [] [] / [] [] [] []). Below these is a section for **DAY 0 PRE-TREATMENT VISIT**. A red arrow points from the original labels to the transformed labels on the right. The transformed labels are: **DM (Demographics)** (light blue), **DS (Disposition)** (light green), and **SV (Subject Visits)** (light orange). The form structure on the right is identical to the one on the left, but the labels are now formatted with parentheses and bold text.

eXtensible Markup Language (XML)

- Markup language much like HTML
- Designed to store and transport data
- Designed to be self-descriptive
- Used in define.xml and when uploading results to clinicaltrials.gov PRS

<xml />

eXtensible Markup Language (XML)

```
<article>
  <author = "1">
    <name>James Rollins</name>
    <published>2007</published>
    <title>The Judas Strain</title>
    <abstract>Buried deep within a jungle, ancient ruins conceal...</abstract>
  </author>
  <author = "2">
    <name>J. R. R. Tolkien</name>
    <published>1954</published>
    <title>The Lord of the Rings, The Two Towers</title>
    <abstract>The righteous characters are directly battling...</abstract>
  </author>
</article>
```



	author	name	title	published	abstract
1	1	James Rollins	The Judas Strain	2007	Buried deep within a jungle, ancient ruins conceal...
2	2	J. R. R. Tolkien	The Lord of the Rings, The Two Towers	1954	The righteous characters are directly battling...

Summary

- Don't be afraid to experiment with different languages and methods
- Having an idea of different languages can help get tasks done faster
- Increased value to your team
- Programming outside of SAS and R can be fun!

Thank You

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