Functions

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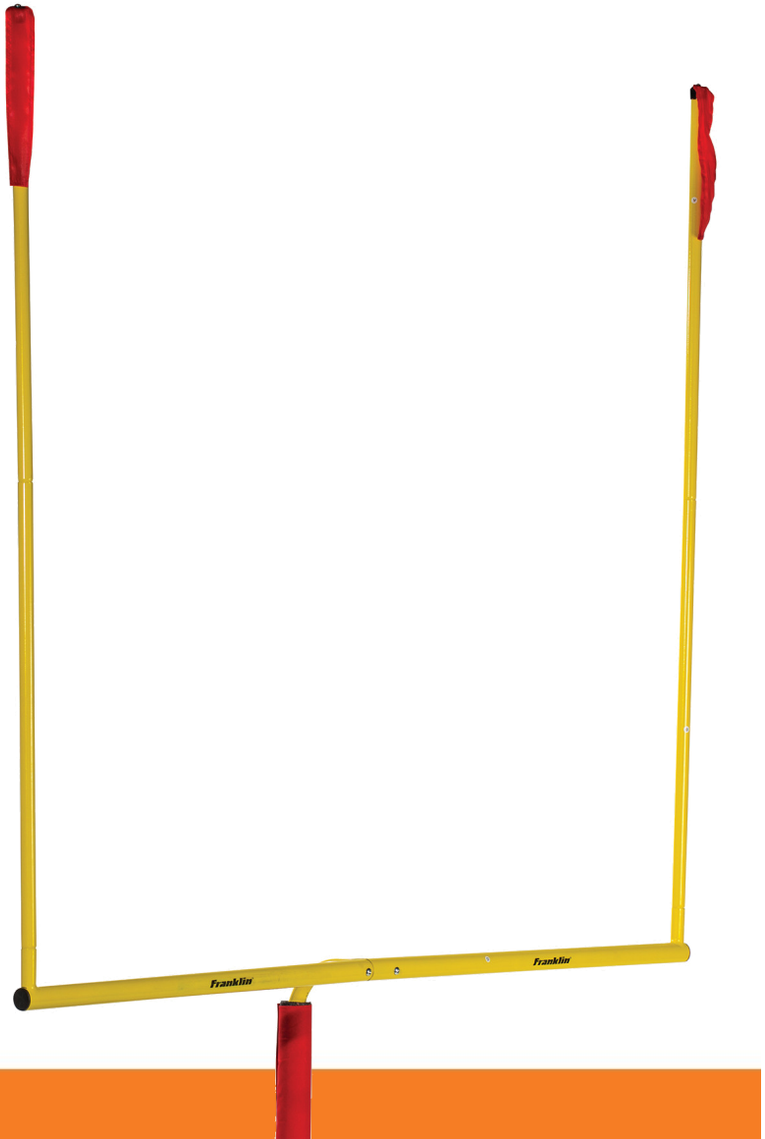
Goals

1. List 2 flavors of function
2. Explain the advantages of strong typing
3. Define an 'advanced' function



Roadmap

1. Syntax
2. Adding Types
3. 'Advanced' Functions
4. Validation
5. Begin, Process, End

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Syntax

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Overview

- Named list of PowerShell statements
- Invoked like a cmdlet
- Variations
  - Plain
  - Advanced
  - Filter

Variations

This is ok

```
function Get-Identity($Self){
  return $Self
}
```

This is better

```
function Get-Identity{
  param{
    $Self
  }
  return $Self
}
```

Reasons to Prefer

- Same syntax for
  - Scripts
  - Codeblocks
  - 'Advanced Functions'

Return Values

- Explicit via
  - Keyword `return`
  - Cmdlet `Write-Output`
- Implicit via... anything else

Example

What's the output?

```
function Select-Sum($A, $B){
  $result = $A + $B
  "Result is: $result"
  return $result
}
$sum = Select-Sum 11 5
$sum.GetType()
```

Refactored

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```powershell
function Select-Sum($A, $B){
  $result = $A + $B
  Write-Information "Result is: $result"
  return $result
}
# Notice: the debug preference
$sum = Select-Sum 11 5 -Information Continue
$sum.GetType()
```

Alternative Preference Variables

- Examples:
  - `$InformationPreference`
  - `$DebugPreference`
  - `$VerbosePreference`
- Options
  - `SilentlyContinue`, `Continue`, `Stop`, `Ignore`…

Example


```powershell
function Select-Sum($A, $B){
  # ...
}

$InformationPreference = Continue
$sum = Select-Sum 11 5
$sum.GetType()
```

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Adding Types

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Motivation

- For developers, not many guardrails
- For consumers, it's hard to tell what this is doing
  - What it returns
  - What it expects

```
function Select-Sum($A,$B){
  $result = $A + $B
  return $result
}
$sum = Select-Sum 11 'chicken' 44
```

Refactored

```powershell
function Select-Sum{
  [OutputType([int])]
  Param(
    [int]$A,
    [int]$B
  )
  $result = $A + $B
  Write-Information "Result is: $result"
  return $result
}
```

About `OutputType`

- Metadata only
- Not enforced
- **BUT** still a good idea

Example

```powershell
function Get-Pi{
  [OutputType([float])]
  Param()
  return "Apple"
}
"Expected type: "
(Get-Command Get-Pi).OutputType.Name

"`nActual type: "
(Get-Pi).GetType().Name
```

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'Advanced' Functions

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Defined

Advanced functions allow you create cmdlets that are written as a PowerShell function. Advanced functions make it easier to create cmdlets without having to write and compile a binary cmdlet.

- **Motivation** having a function that works just like built-in cmdlets
  - `ShouldProcess`
  - `Whatif`

Overview

Not Advanced

```powershell
function Get-Self{
  Param($Self)
  return $Self
}
```

Totally Advanced

```powershell
function Get-Self{
  [CmdletBinding()]
  Param($Self)
  return $Self
}
```

Ex: SupportsShouldProcess

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```powershell
function Remove-File {
  [CmdletBinding(
    SupportsShouldProcess,
    ConfirmImpact = 'High'
  )]
  param(
     [Parameter(Mandatory)]
     [string]$path
  )
  if ($PSCmdlet.ShouldProcess($path)) {
    Remove-Item $path
  }
}
```

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Validation

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Overview

- Powershell comes with attributes for checking parameters
- Most useful:
  - ValidateCount
  - ValidateRange
  - ValidateScript
  - ValidateSet

Example

```powershell
function Write-Update{
  param(
    [Parameter(Mandatory)]
    [ValidateLength(1, 100)]
    [string] $Message,

    [Parameter(Mandatory)]
    [ValidateSet('Low', 'Medium', 'High')]
    [string] $Severity,

    [Parameter(Mandatory)]
    [ValidateScript( { Test-Path $_ } )]
    [string] $Path
  )


  Write-Host "$Severity - $Message - $Path"
```

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Begin, Process, End

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Motivation

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- Normally a function is **stateless**
- Working on a pipeline can require keeping state around

```
1  function Select-Sum([int[]]$Xs) {
2    $sum = 0
3    foreach($x in $Xs){$sum += $x}
4    return $sum
5  }
6  ## Wrong answers
7  $s1 = Get-Process | % WorkingSet | Select-Sum
8  $s2 = Get-Process | % WorkingSet | %{ Select-Sum $_ }
9
10 ## Slightly ugly


11 $sets = Get-Process | % WorkingSet
```

Piping into Functions

- Optionally, a function can have 3 blocks
  - **Begin** runs before the first thing piped in
  - **Process** for each item
  - **End** after the last item

```
function Save-Users{
  begin { Write-Host "Opening DB connection"  }

  process { Write-Host "Saving $_" }

  end{ Write-Host 'Closing connection' }



}
```

Select-Sum Refactored

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```powershell
function Select-Sum {
  begin { $sum = 0 }
  process { $sum += $_ }
  end {return $sum}
}

Get-Process | % WorkingSet | Select-Sum
```

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Review

1. List 2 flavors of function
2. Explain the advantages of strong typing
3. Define an 'advanced' function