Client-Side Web GIS

Arcade

Image from NASA: https://commons.wikimedia.org/wiki/File:Earth_Western_Hemisphere_transparent_background.png#filelinks

WV VIEW

AmericaView
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1

Preparation and Resources

2

2

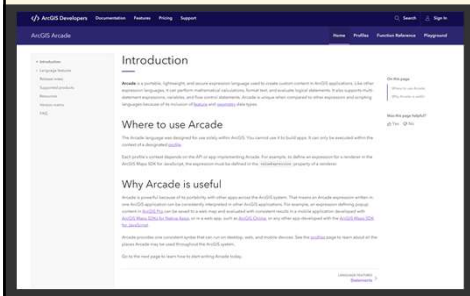
What is Arcade?

- Expression language created by ESRI
- Lightweight, secure, and portable
- Works across ESRI software, tools, and apps
- Can be used to calculate fields, build labels, and format popup content

3

3

Documentation

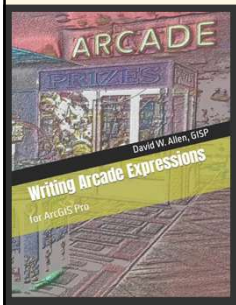


https://developers.arcgis.com/arcade/

4

4

Text Recommendation



https://www.amazon.com/Writing-Arcade-Expressions-ArcGIS-Pro/dp/0578533006

5

5

Characteristics of the Language

- Expression language
- Based on JavaScript
- Variables declared with var
- Should end statements with ;
- Comments use // for single line and /* */ for multi-line

6

6

Variables

- Names:
  - begins with a Latin letter, underscore, or $
  - contains only Latin letters, Latin numbers, underscore, or $
  - must not match any reserved words
- Variables may be reassigned to new values at any point in the expression
- Variables declared outside of a function have global scope
- Variables declared inside of a function have local scope
- Arcade does not use block scope

7

7

Data Types

- Array = list of elements []
- Attachment = info about feature service attachments
- Boolean = logically true or false
- Date = dates
- Dictionary = collection of properties stored as name:value pairs
- Feature = geometry with dictionary of attributes
- FeatureSet = connection to layer in memory
- FeatureSetCollection = collection of FeatureSets
- Geometry = point, multipoint, polyline, polygon, extent
- Number = number treated as a number
- Portal = instance of ArcGIS Portal (ArcGIS Online or ArcGIS Enterprise Portal)
- Text = text or numbers treated as text

8

8

Arithmetic Operators

Operator	Name	Description	Example
+	Addition	Adds two numbers; can also concatenate two text values	5+5
-	Subtraction	Subtracts two numbers	5-5
*	Multiplication	Multiplies two numbers	5*5
/	Division	Divides two numbers	5/5
%	Modulus	Returns the remainder of a number divided by another number	10 % 2
++	Increment by one	Increments a number variable by one	x++ or ++x
--	Decrement by one	Decrements a number variable by one	--x or x--

https://developers.arcgis.com/arcade/guide/operators/

9

9

Assignment Operators

Operator	Name	Description	Example
=	Equals	Assigns a value to a variable	x = 10
+=	Add assign	Adds a number to the value of a number variable and assigns the result to the variable	x += 10
-=	Minus assign	Subtracts a number from a value of a number variable and assigns the result to the variable	x -= 10
*=	Multiply assign	Multiplies a number by the value of a number variable and assigns the result to the variable	x *= 10
/=	Divide assign	Divides the value of a number variable by another number and assigns the result to the variable	x /= 2

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10

Comparison Operators

Operator	Name	Description	Example
==	Equal to	Evaluates to true if the x-value is equal to the y-value	x==y
!=	Not equal to	Evaluates to true if the x-value is not equal to the y-value	x!=y
>	Greater than	Evaluates to true if the x-value is greater than the y-value	x>y
>=	Greater than or equal	Evaluates to true if the x-value is greater than or equal to the y-value	x>=y
<	Less than	Evaluates to true if the x-value is less than the y-value	x<y
<=	Less than equal to	Evaluates to true if the x-value is less than or equal to the y-value	x<=y

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11

Logical operators

Operator	Name	Description	Example
| |	Logical or	Returns true if one of two statements evaluates to true	if (x==9 || y==0){}
&&	Logical and	Returns true if both statements evaluate to true	if (x==9 && y==0){}
!	Logical not	Returns true if the statement does not return true	if(!didItWork) { console("No. It didn't work.") }

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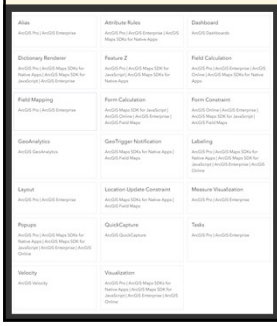
12

Profiles



- Labeling
- Popups
- Field calculation
- Visualization
- Many others

https://developers.arcgis.com/arcade/profiles/

13

13

Functions

```
function abmult(a, b) {
  return a * b;
}
```

14

14

Control flow

```
var x = 8;
if (x === 10) {
  console.log("Value is 10.");
} else if (x < 10) {
  console.log("Value is less than 10.");
} else {
  console.log("Value is larger than 10.");
}
```

15

15

IIF

```
var x = IIF($feature.SUB_REG == 'N Eng', "New England", "Not New England");
return x;
```

16

16

When

```
return When(
  $feature.SUB_REG == 'E N Cen', "East North Central",
  $feature.SUB_REG == 'E S Cen', "East South Central",
  $feature.SUB_REG == 'Mid Atl', "Mid-Atlantic",
  $feature.SUB_REG == 'Mtn', "Mountain",
  $feature.SUB_REG == 'N Eng', "New England",
  $feature.SUB_REG == 'Pacific', "Pacific",
  $feature.SUB_REG == 'S Atl', "South Atlantic",
  $feature.SUB_REG == 'W N Cen', "West North Central",
  $feature.SUB_REG == 'W S Cen', "West South Central",
  "Other"
);
```

17

17

Decode

```
return Decode($feature.SUB_REG,
  'E N Cen', "East North Central",
  'E S Cen', "East South Central",
  'Mid Atl', "Mid-Atlantic",
  'Mtn', "Mountain",
  'N Eng', "New England",
  'Pacific', "Pacific",
  'S Atl', "South Atlantic",
  'W N Cen', "West North Central",
  'W S Cen', "West South Central",
  "Other"
);
```

18

18

For Loop

```
for
for(variable, condition, expression){
        Code to execute;
}
for...in
for(variable in array){
        Code to execute;
}
```

19

19

Format a temperature value

- Round off value
- Convert from Celsius to Fahrenheit
- Add degree symbol and “F”

```
Round(($feature.tempmn*(9/5))+32, 1) + "\u00B0" + "F";
```

20

20

Format currency

- Add dollar sign
- Convert to text
- Add comma separators
- Add zeros

```
"$" + Text($feature.med_ncm, '#,###') + ".00";
```

21

21

Format percentages

- Round off value
- Add percent sign

```
Round($feature.per_for,1) + "%";
```

22

22

Format text

- Replace portion of text in a string

```
Replace($feature.NAME, " County", "");
```

23

23

Concatenate strings

```
$feature.NAME + " is in " + $feature.STATE_N + "
and in the " + $feature.SUB_REG + " subregion.";
```

24

24

Concatenate with template literals

```
`${$feature.NAME} is in ${$feature.STATE_N} and
in the ${$feature.SUB_REG} subregion.`;
```

```
`${$feature.NAME}, ${$feature.STATE_N} has
a population of ${Text($feature.POPULAT,
'#,###')}.`;
```

25

25

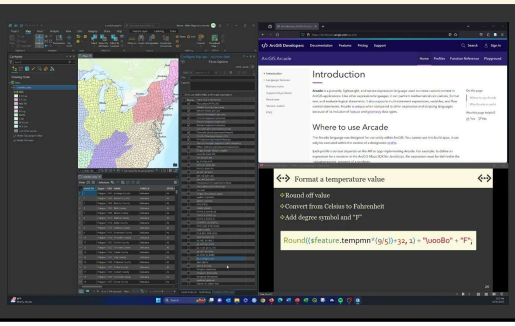
Control Flow

```
if ($feature.med_ncm > 60000) {
        return "High income"
} else if ($feature.med_ncm <= 60000 && $feature.med_ncm > 40000) {
        return "Medium income"
} else {
        return "Low income"
};
```

26

26

Video: Arcade



27

27

This is the end of this lecture module.

Please return to the West Virginia View Webpage for additional content.

28