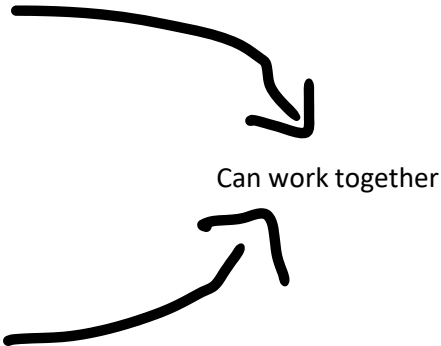# Blueprint vs C++

Tuesday, December 19, 2023   11:15 AM

Blueprint
- Quick Change
- Beginner Freindly
- Easy to discover
- Tailor made to Unreal Engine
- Designer/Artist Friendly

Can work together

C++
- More concise
- Industry Standard
- High Speed
- Access to all areas
- Good for bigger projects

Unreal Libraries are written in C++

Can write code in c++ to make libraries

Blueprints can access all libraries

Going to go over:
- Programming basics with BP
  - Variables, if-statements, functions
- Basic maths and concepts
  - Vectors, Transforms, Rotations
- Unreal core concepts
  - Actors, Components, Pawn, Maps
- Assets
  - Marketplace, Importing, BSP Modeling, Materials

Help

Useful info to include in help requests:
- Steps you've taken
- Screenshots
- Full build logs C++
- Editor Log
- Your project using zip

D:\UE5Projects\IntroProject\Saved\Logs is where my logs are

Use github gist to share logs

Warehouse Wreckage Project

Tuesday, December 19, 2023 11:31 AM

Project Plan

Tuesday, December 19, 2023   11:32 AM

- Playing with Physics
- Spawning Projectiles
- Aiming the projectile
- Building a level
- Limiting ammo
- Reload Levels

Visual Programming

Tuesday, December 19, 2023   11:33 AM

Glossary

Tuesday, December 19, 2023   1:53 PM

Event Graph - The Canvas for our Blueprint
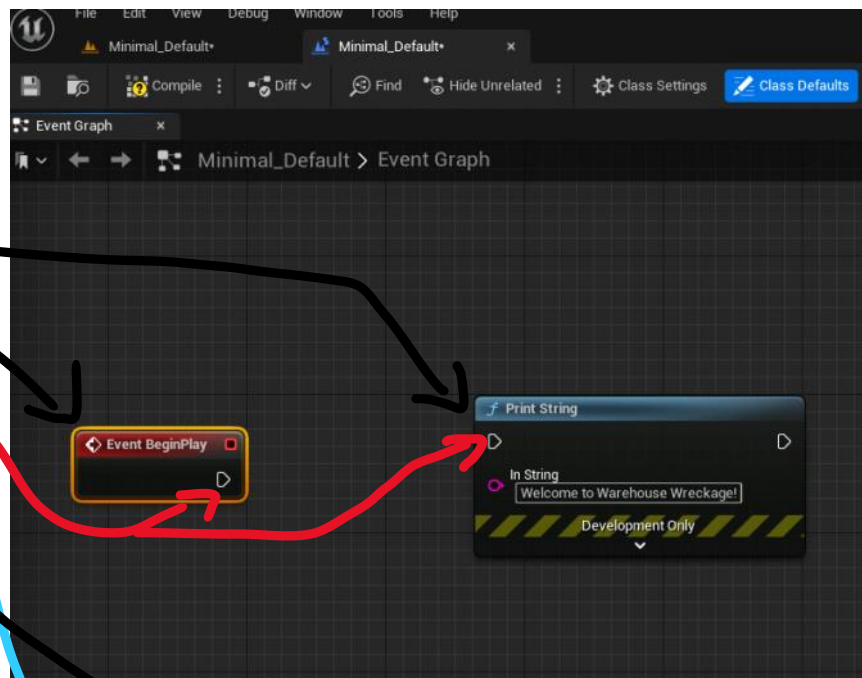Node - Premade functionality
String - text
Event - A "when" node
Pin - Sockets we can connect up
Input Pin - When to run this node
Output Pin - What to do after

Connection - Wires between pins

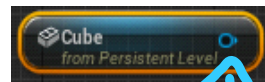Objects - Collections of data and functionality
Actors - Object that can go in a level
Component - Objects that can go on an actor
Reference - Where to find an object
Data Pin - The input or output data for a node
Execution Pins - When to run this node

Impulse - (physics) happens instantaneously
Force - Happens over time
Spawning - Creating object while we are playing
Transform - Location, rotation, and scale
Return Pin - Output of a node

Struct - An object that is usually small
Data Type - Shape of our data
Objects - Collections of data and functionality

Branch - Do something or don't, based on a bool
Booleans - A yes or no data type
Comparison - Less than, Greater, Equal, etc

Side Effects - A function that has an observable effect
Pure Function - A function with no side effects

Object Oriented Programming - Functions live with the data they manipulate
Member Function - A function on a class, always called on an particular instance
Self - A node available in member functions, always points to the current instance

Objects

Tuesday, December 19, 2023   3:03 PM

Example:

Adventurer:
- Data:
  - Exp = 500
  - Lvl = 2
- Functionality:
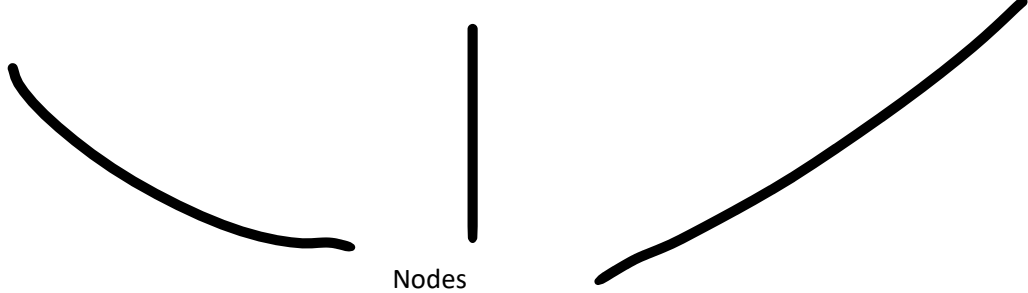 - Fire Arrows
  - Jump
  - …

Example:

Player:
- Data:
  - Using Controller = yes
  - PlayerNum = 2
- Functionality:
  - Get current input
  - Get skill level
  - …

Example:

List:
- Data:
  - Items: 1, 2, 3, 4
- Functionality:
  - Remove last item
  - Add to the end
  - …

Nodes

References

Cubes Address

Cube

Static Mesh Component

Bob

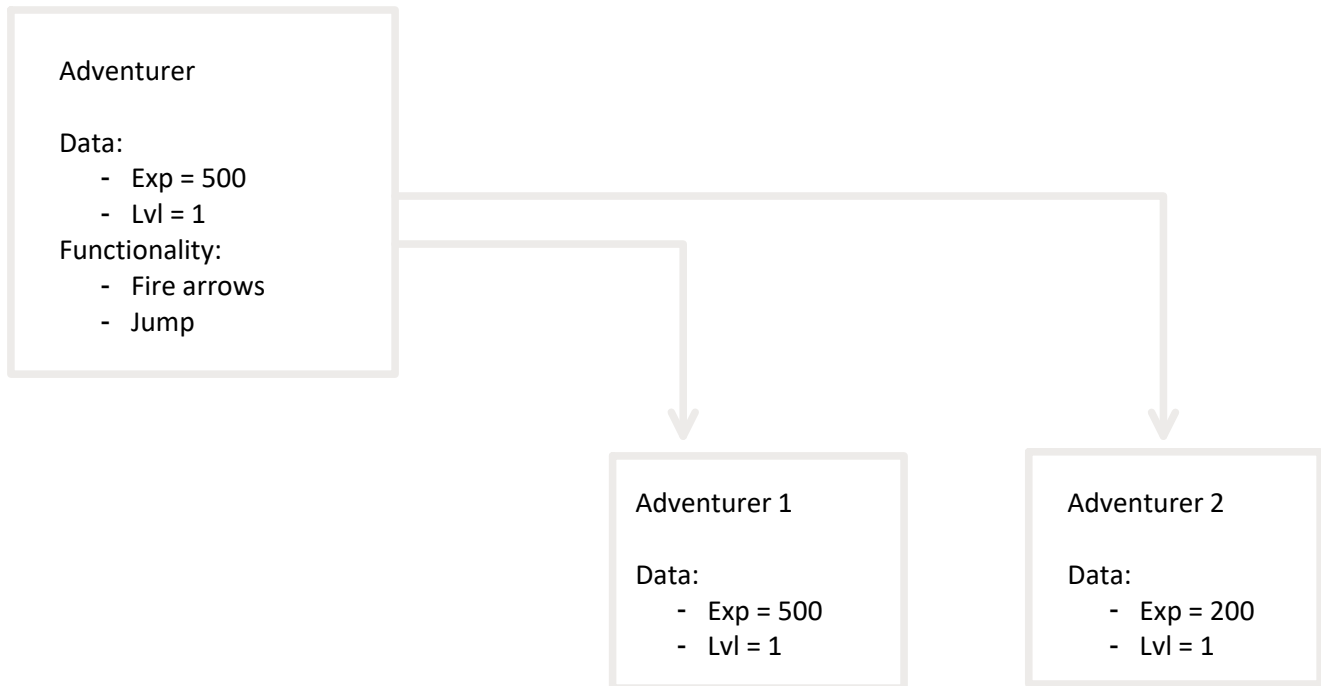Where does
Static Mesh Component
live?

What's your name?

Force and Impulse

Force = Mass * Acceleration
Impulse = Mass * Velocity Change

Classes and Instances

Tuesday, December 19, 2023   4:06 PM

Adventurer

Data:
- Exp = 500
- Lvl = 1

Functionality:
- Fire arrows
- Jump

Adventurer 1

Data:
- Exp = 500
- Lvl = 1

Adventurer 2

Data:
- Exp = 200
- Lvl = 1

Data Types

- How is it represented in binary?
- What can we do with it?
- The "shape" of data
  - Can't get a square peg in a round hole

Integers   Floats   Strings   Bools
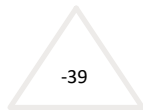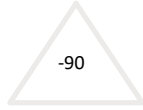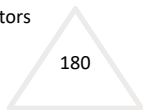
Objects/Structs

Adventurer   Player
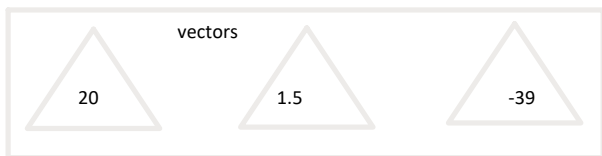
Structs we've seen

Vectors

20	1.5	-39

Rotators

180	0	-90

Transforms

vectors

20	1.5	-39

rotators

180	0	-90

vectors

20	1.5	-39
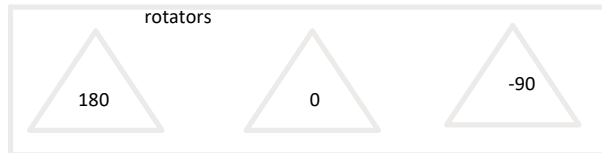
Objects we've seen

- Actors
  - Cubs
  - BP_Projectile
- Components
  - StaticMeshComponent

Vectors

Mathematically
- Direction
- Size (Magnitude)

Programmatically
- 3 floats
- X, Y, Z

(0, 0)

pos

A

newPos   C

B

move

X

Y

A + B = C

pos + move = newPos

X = pos.x + move.x
Y = pos.y + move.y
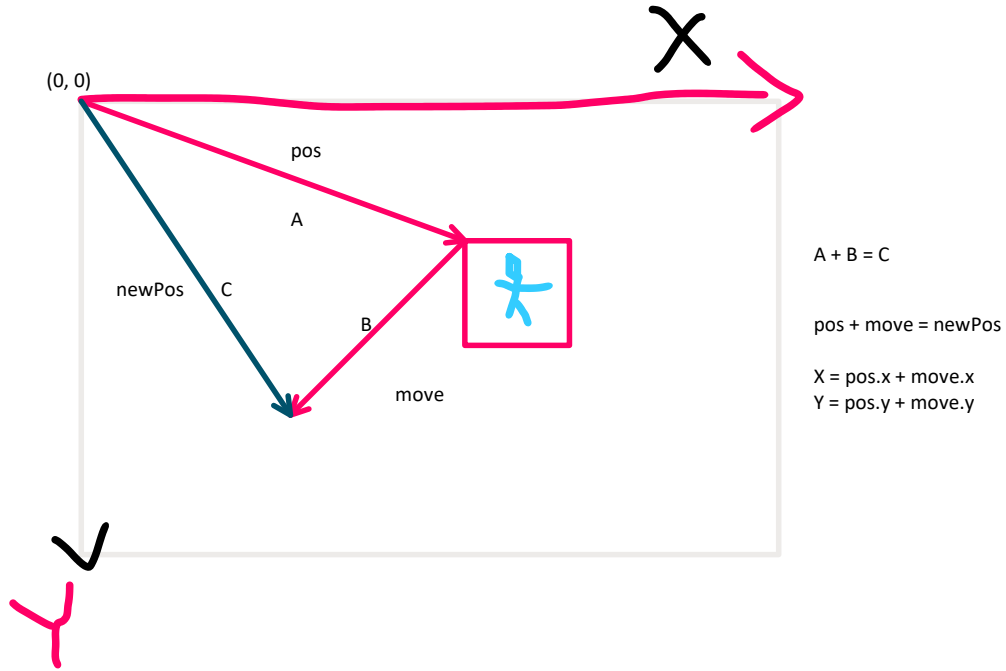
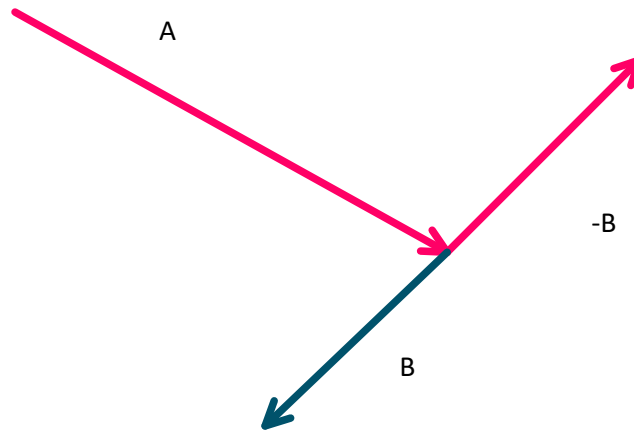# Vector Subtraction

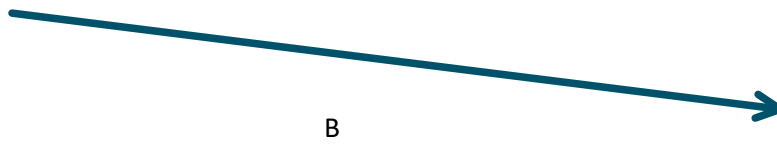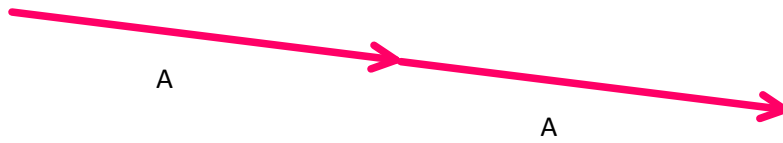Thursday, December 21, 2023   3:46 PM

A - B = C
A + (-B) = C

A

-B

B

Vector Multiplication

Thursday, December 21, 2023   3:48 PM

A

A

B

A * 2 = B

Variables

Friday, December 22, 2023   2:56 PM

- Variables store info
- Each has a NAME
- Each has DATA
- Each is of a particular TYPE

Functions

- Functions execute blocks of blueprint that makes our game do things
- Many nodes provided are functions
- We can create our own functions
- Allow use to stay organized
- And reuse blocks of code

Good Naming

Friday, December 22, 2023   3:42 PM

- Code is communication
- Measure of Code Quality = WTHs / Minute (what the hecks per minute)
- Functions should be verbs
- Unsure? Talk to somebody else

Effects

Friday, December 22, 2023   4:04 PM

Side Effects:
- A function that has an observable effect
- Eg:
  - Print string
  - Add impulse
  - Set ammo

Pure Function:
- A function with no side effects
- No exec pins
- Only return values
- Eg:
  - Get ammo
  - Get Actor Forward Vector
  - Multiply, Minus, Greater

What I learned

Friday, December 22, 2023   4:27 PM

- Blueprint basics: nodes, pins
- Programming basics: variables, strings, references, functions
- Unreal basics: maps, actors, components, transforms, vectors
- Object oriented basics: objects/structs, classes, member functions