



March 20-24, 2023
San Francisco, CA

Motion Matching at EA 5 Years Later

JC Delannoy
Sr Software Engineer, Electronic Arts

#GDC23

About Me

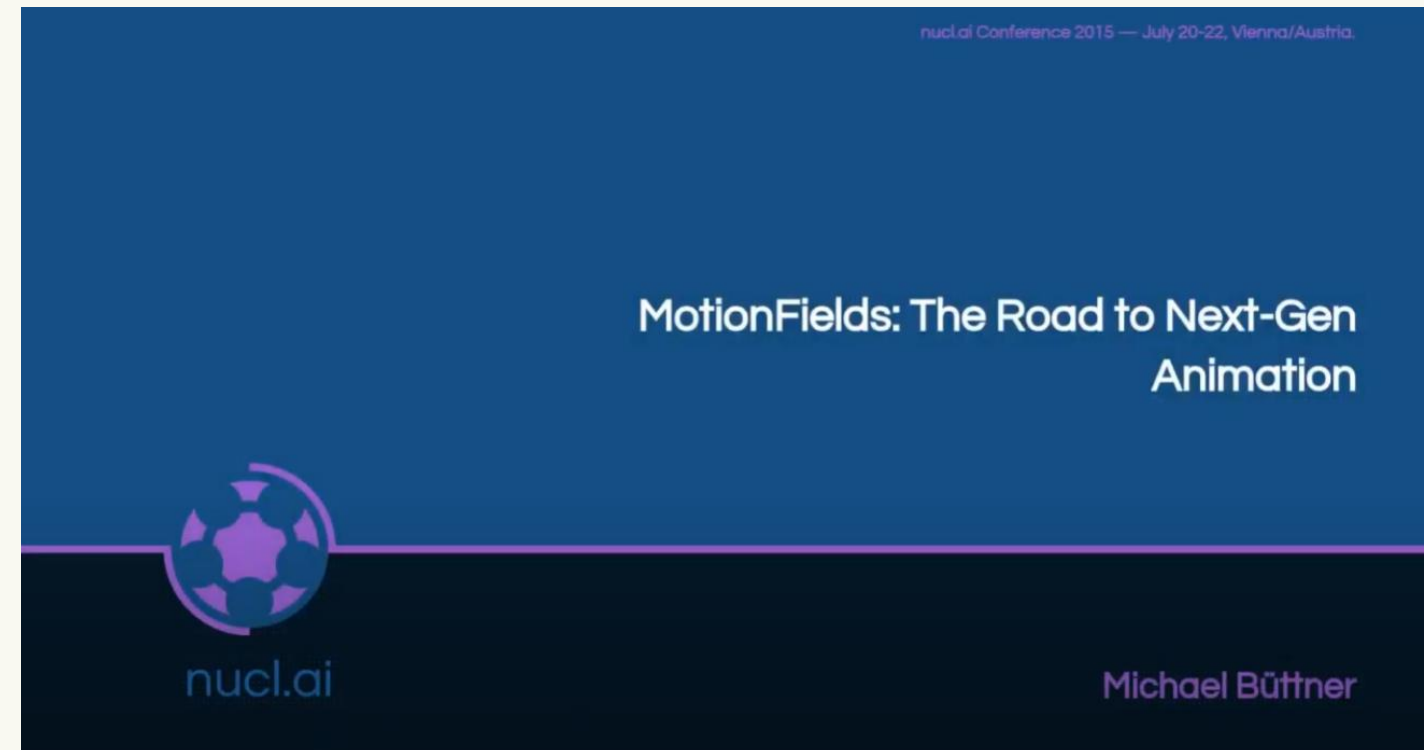
- JC Delannoy
- Senior Software Engineer
- @ Electronic Arts since 2004



△•Team

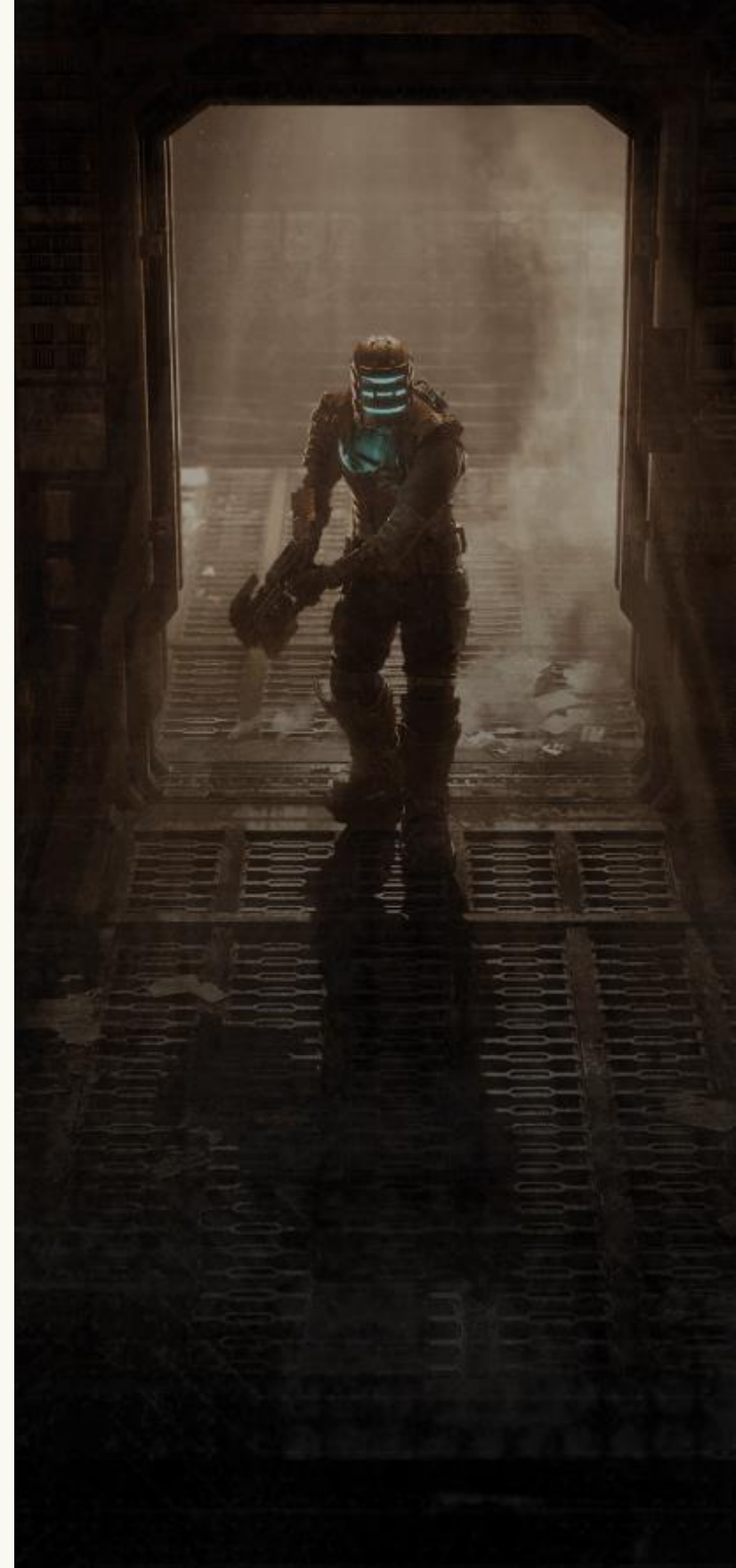
- Applied R&D group for animation
- Many people contributed to our MM implementation
- Big thanks to Paul McComas and Christian Mendoza





What This Talk Is About

- Getting Motion Matching into production can be very challenging.
- Productizing Motion Matching.
- Supporting features we've developed along the way.

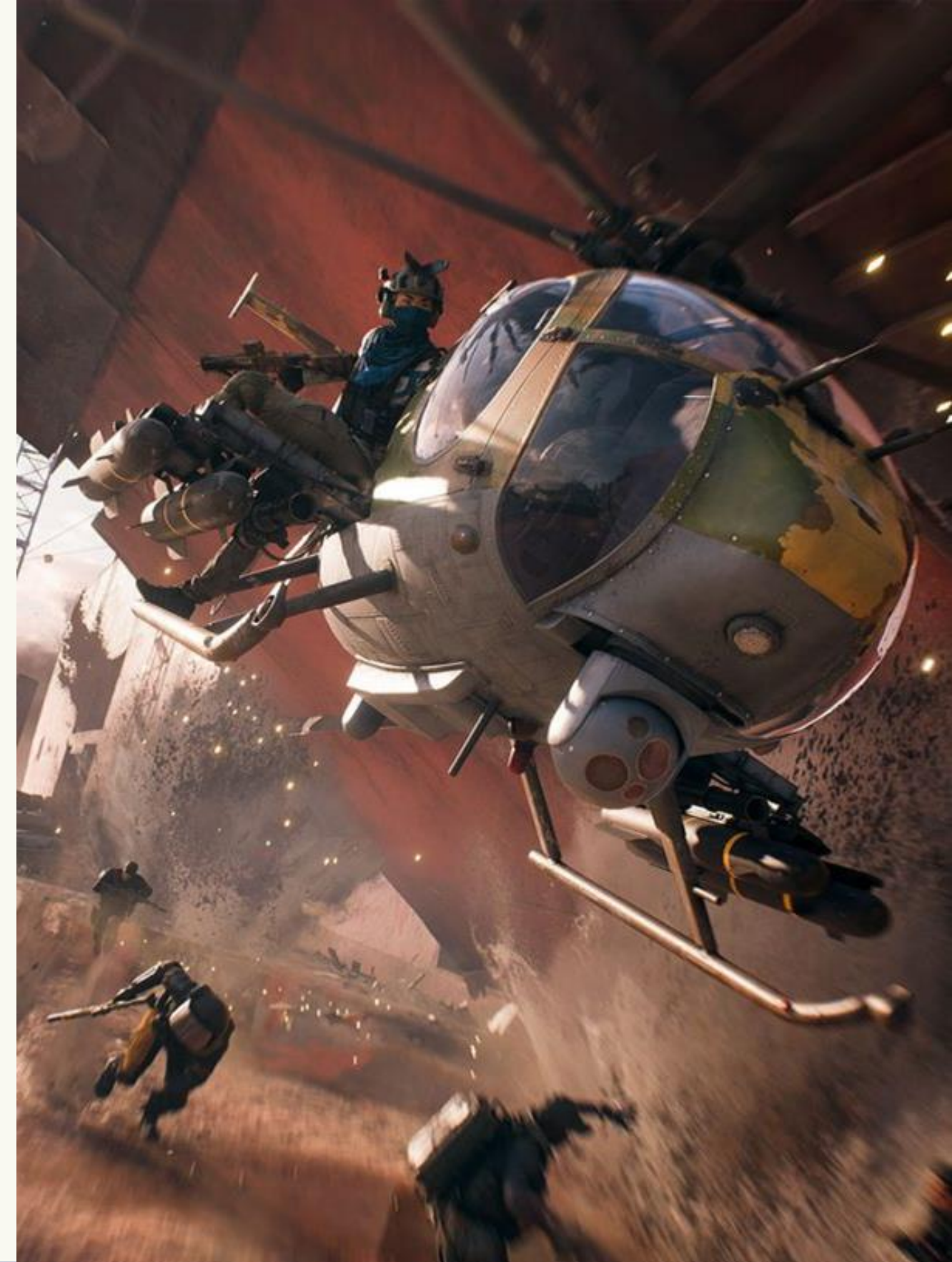


Agenda

- Motion Matching Everywhere
- Organizing Your Data
- Tips, Tricks and Timesavers

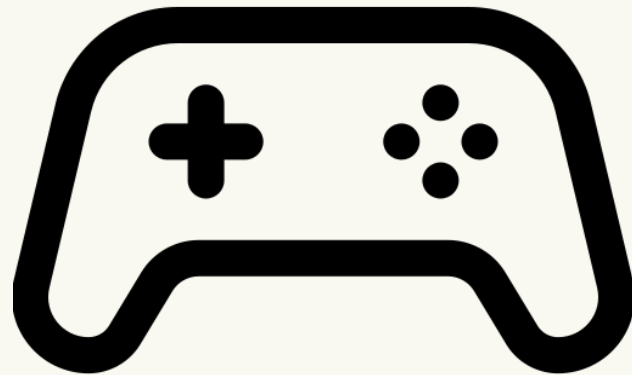


1. Motion Matching Everywhere

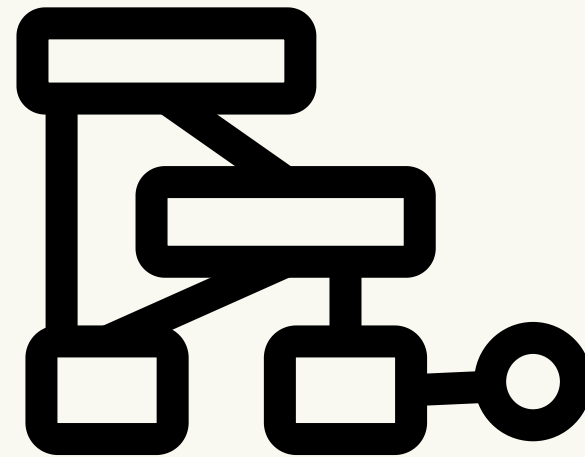


Locomotion Challenges

Constantly changing
inputs



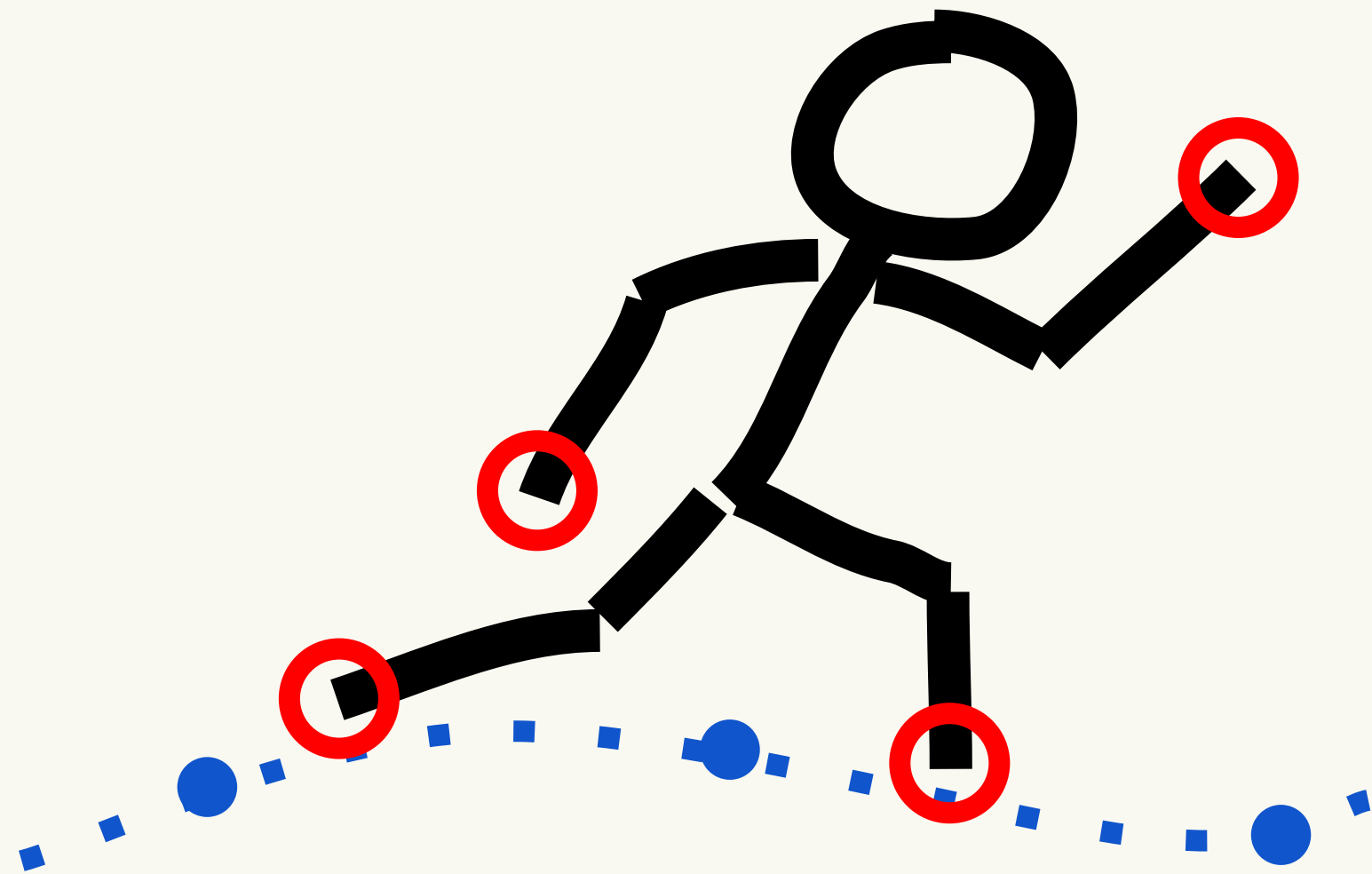
Complex state
machine



Frequent Animation
Transitions



Recap of Motion Matching



Pose Features

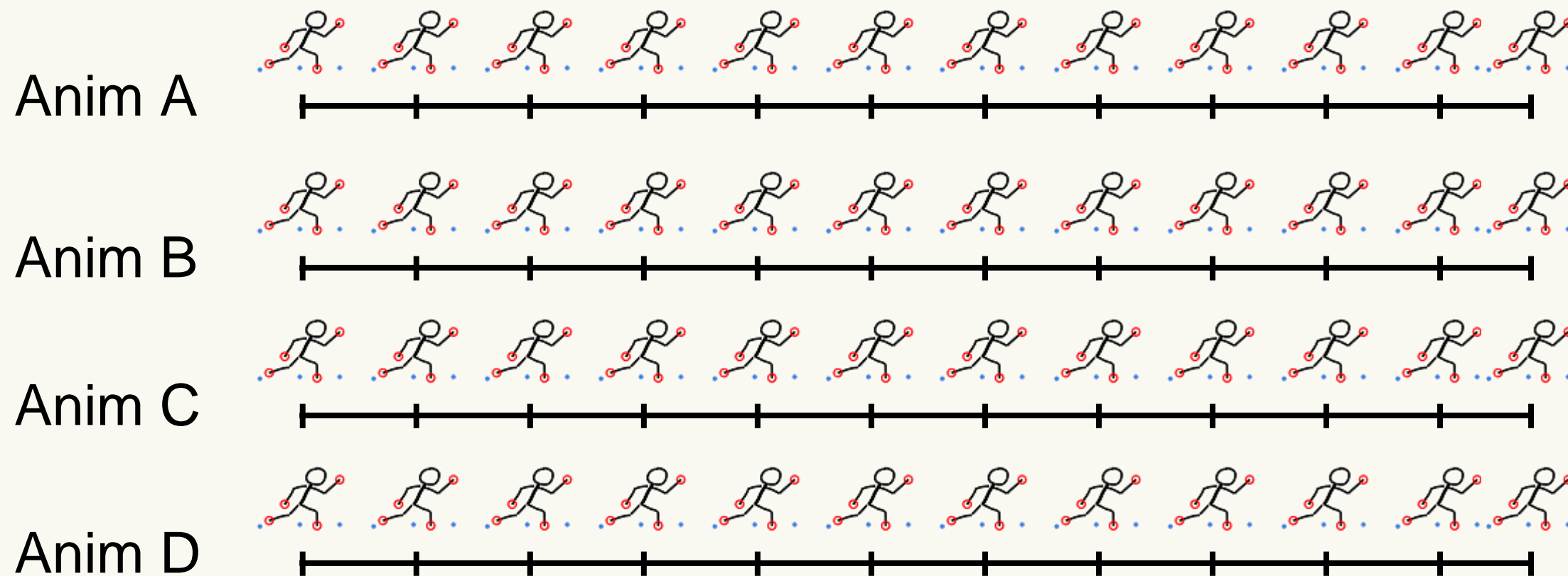
- position
- orientation
- velocity
- angular velocity

Trajectory Features

- current velocity + current facing
- future position/facing
- past position/facing

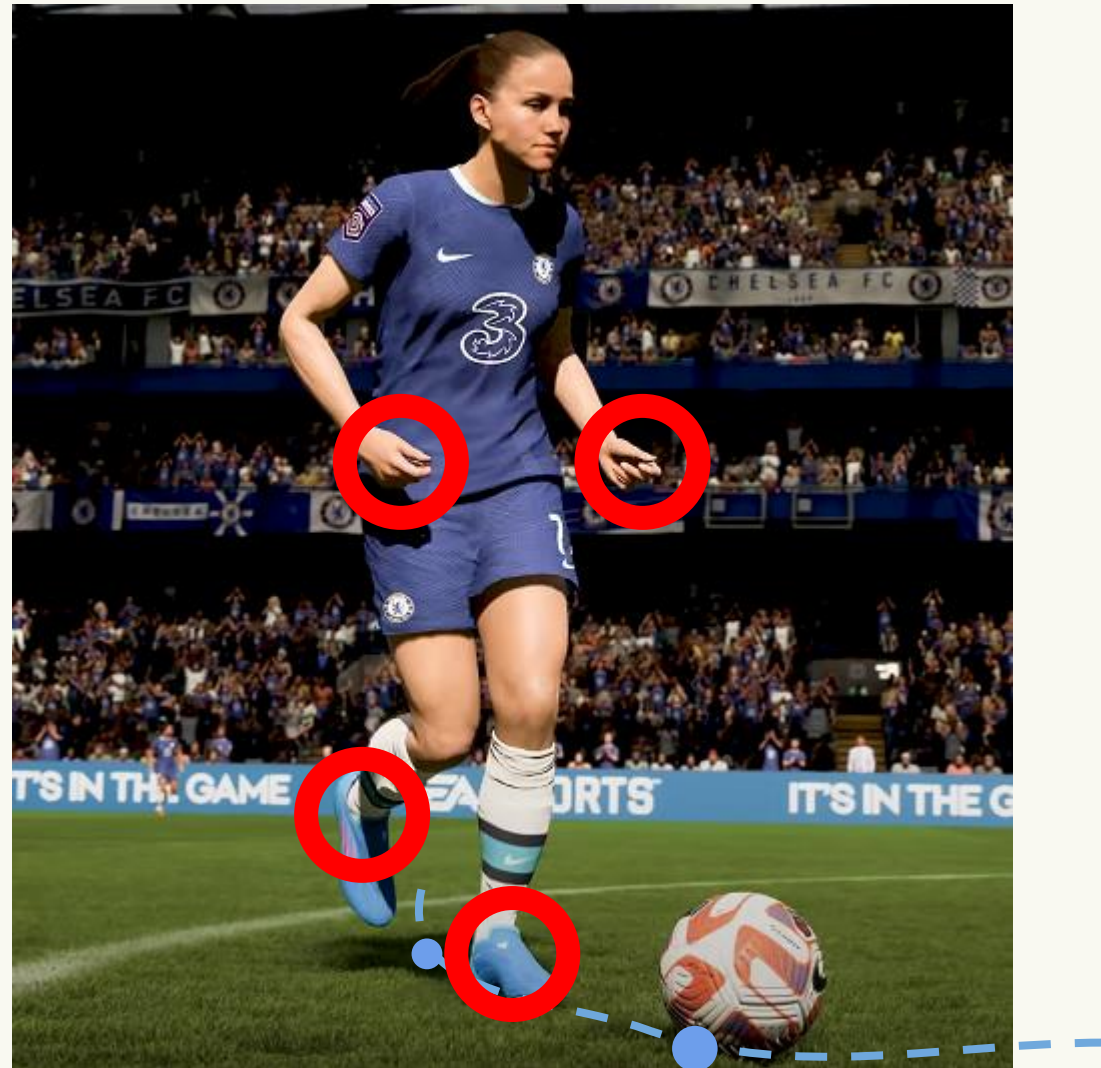
Recap of Motion Matching

Database of Animations



Recap of Motion Matching

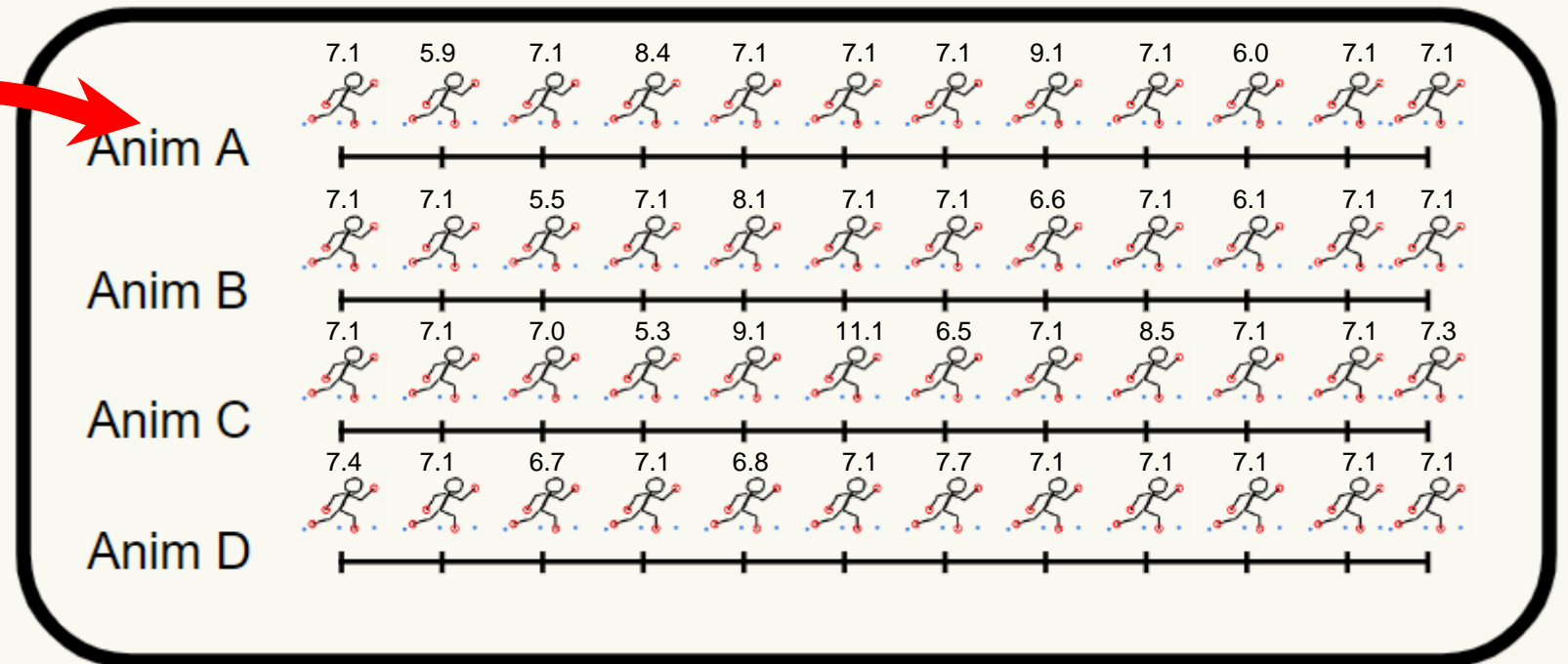
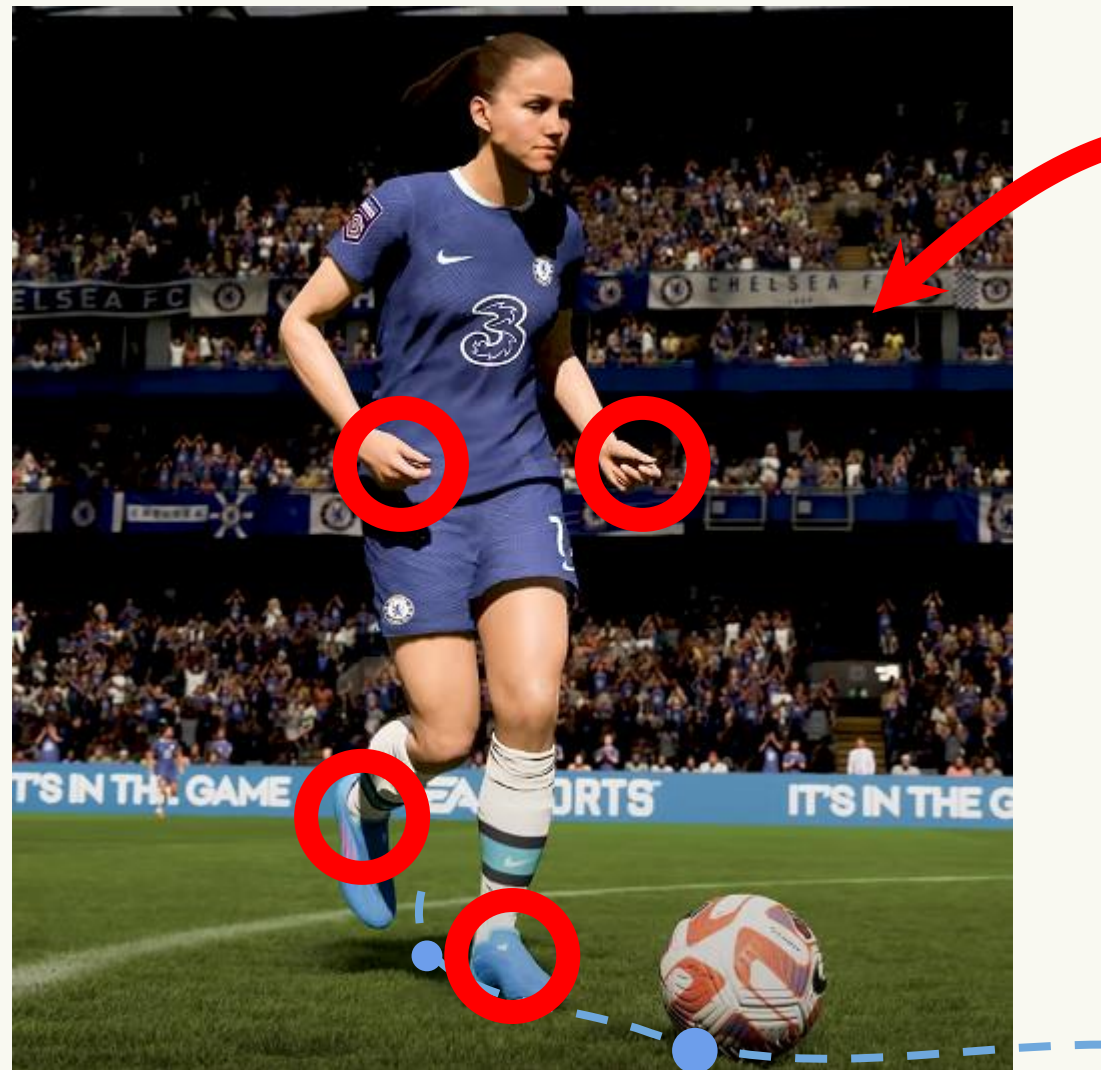
In Game



1. Obtain values for pose + trajectory features in game.

Recap of Motion Matching

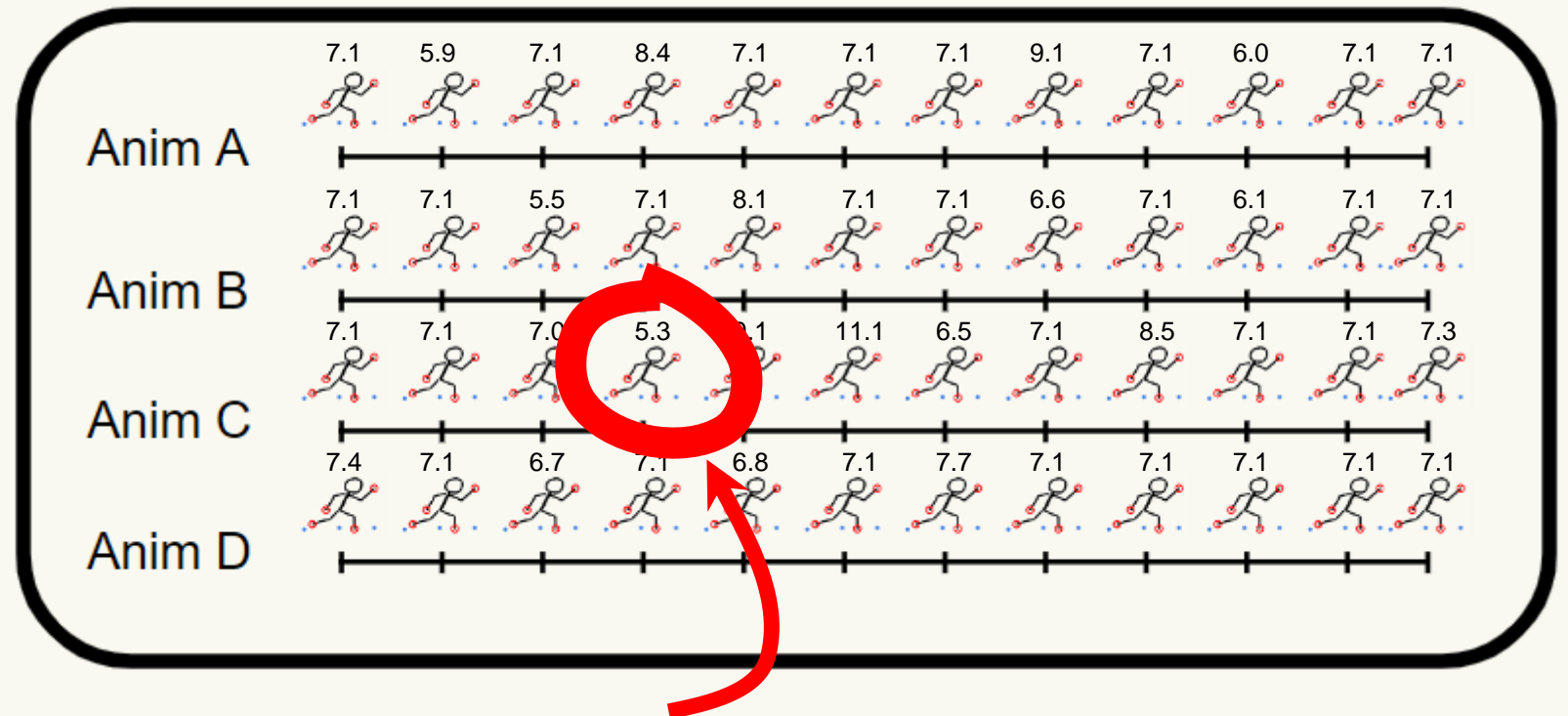
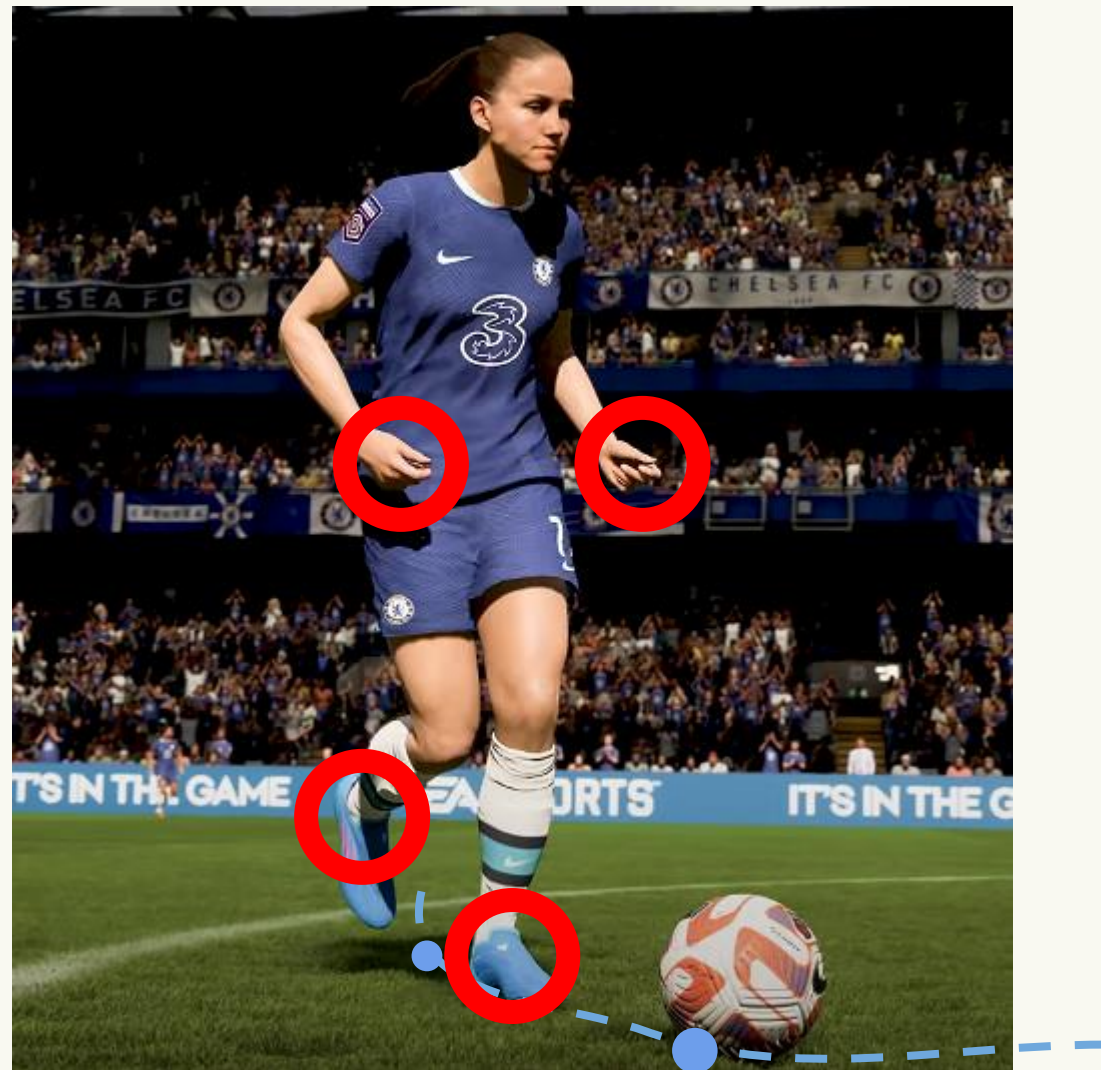
In Game



2. Calculate cost of each frame by comparing features.

Recap of Motion Matching

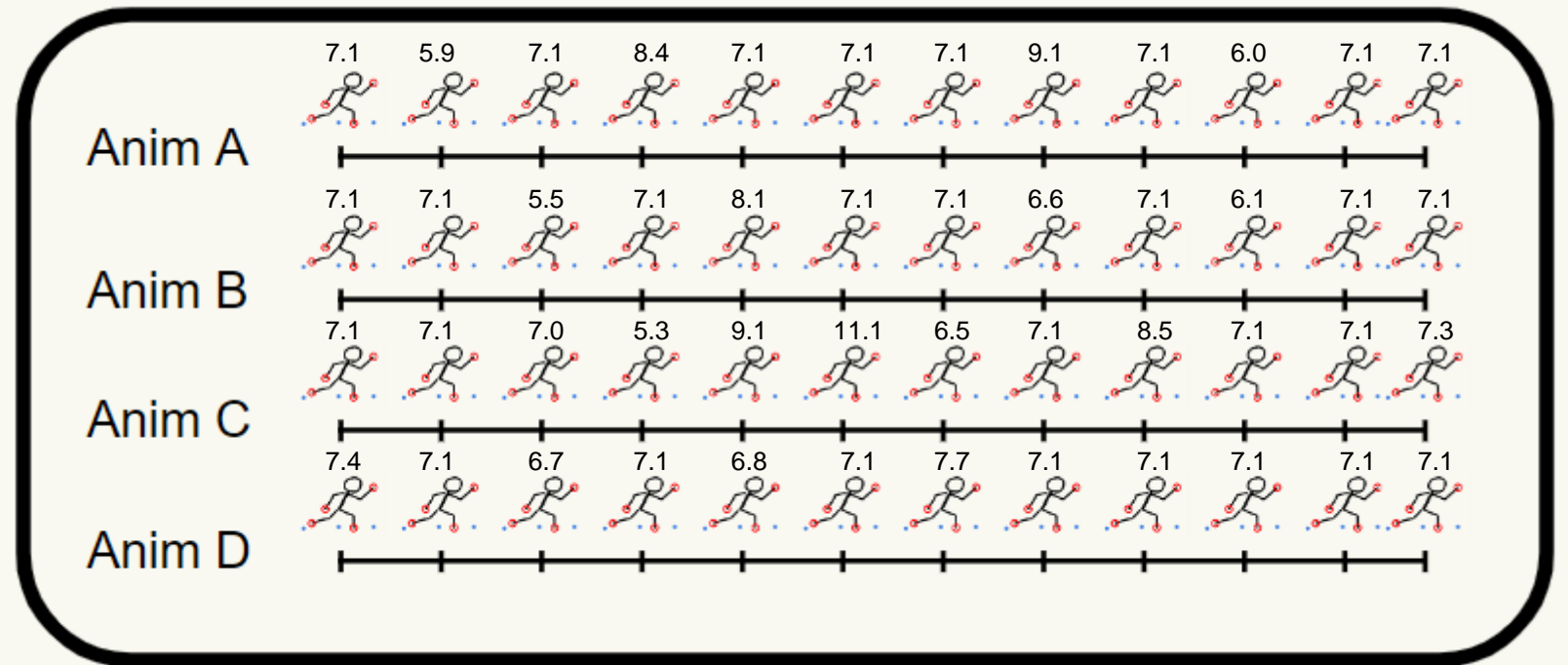
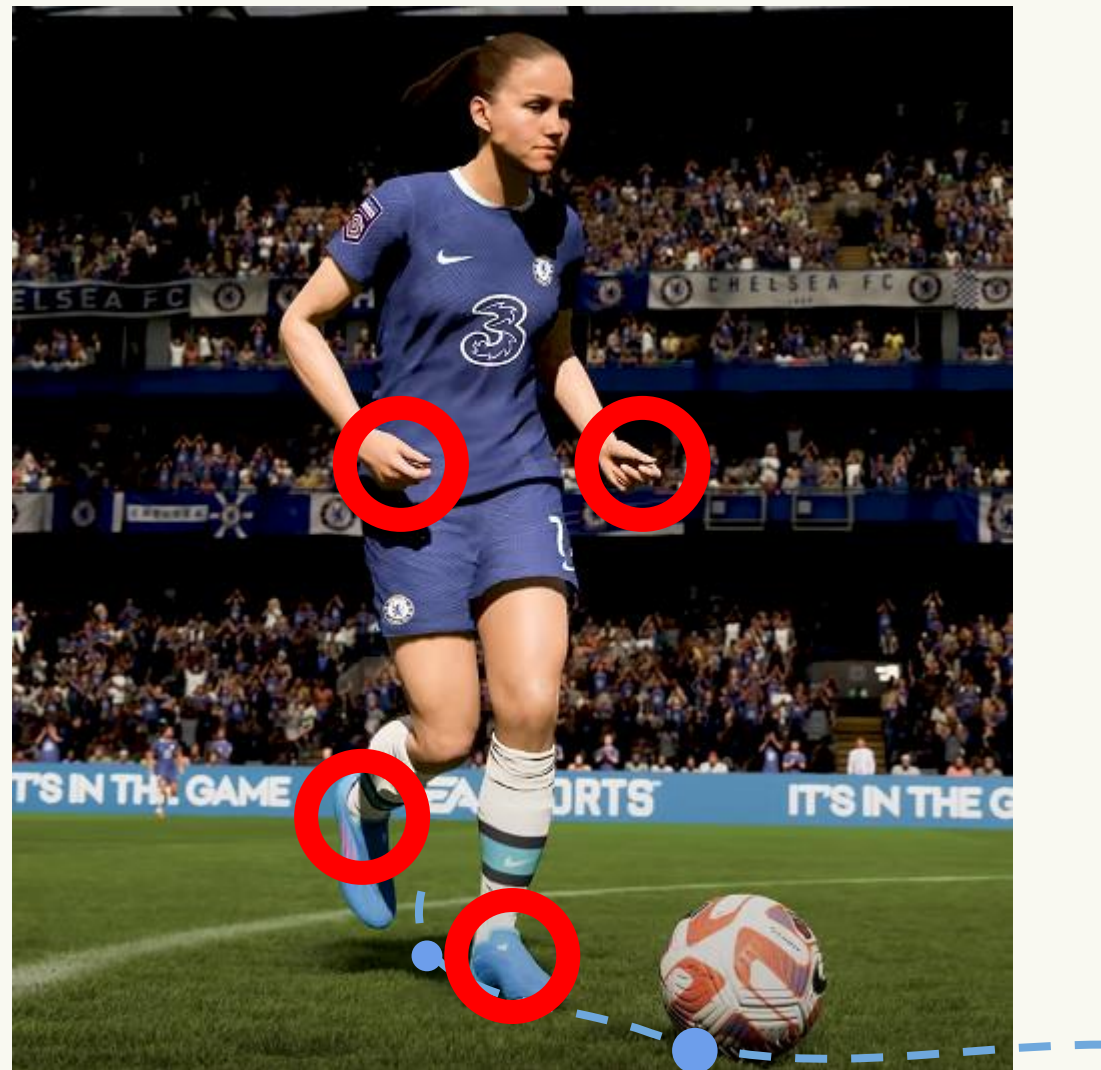
In Game



3. Transition to frame with the lowest cost

Recap of Motion Matching

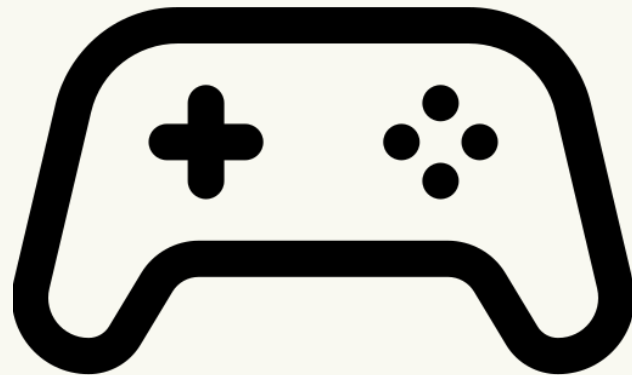
In Game



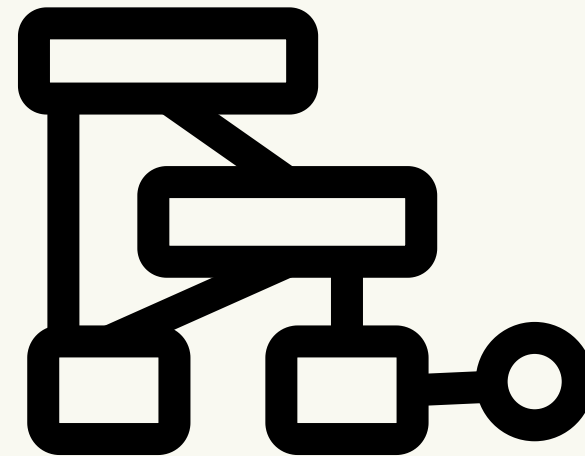
4. Repeat every update.

Locomotion Challenges/Motion Matching

Constantly changing
inputs



Complex state
machine



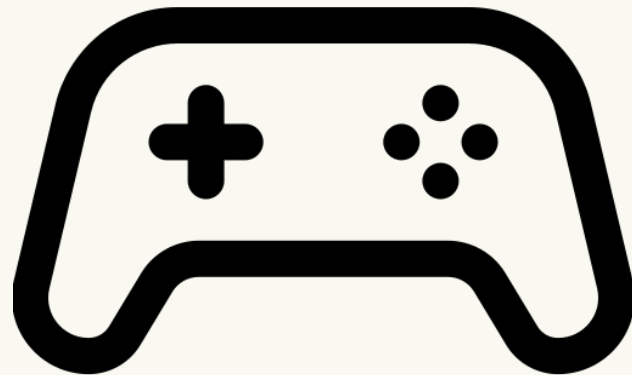
Frequent Animation
Transitions



**Motion Matching
can be run every
frame.**

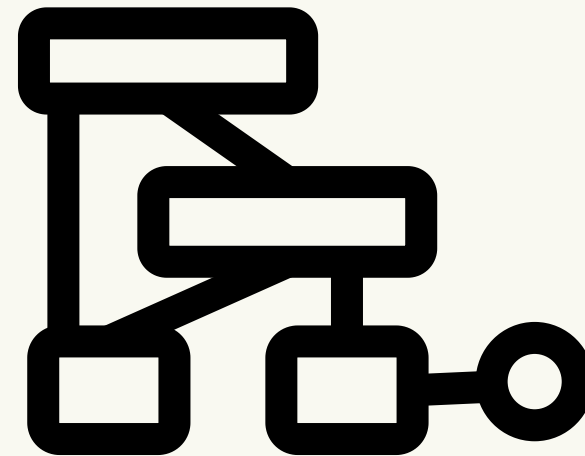
Locomotion Challenges/Motion Matching

Constantly changing
inputs



✓ **Motion Matching
can be run every
frame.**

Complex state
machine



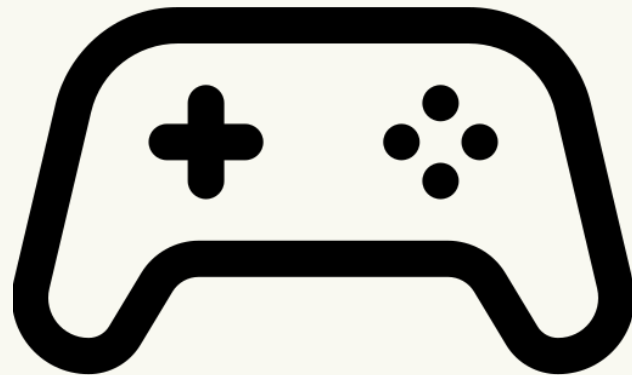
✓ **Does not need a
state machine.**

Frequent Animation
Transitions



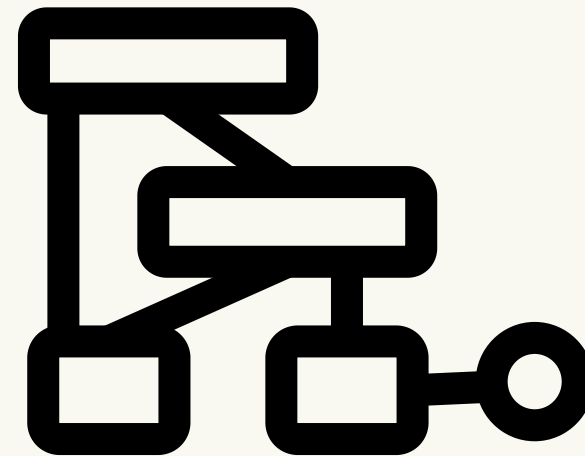
Locomotion Challenges/Motion Matching

Constantly changing
inputs



✓ **Motion Matching
can be run every
frame.**

Complex state
machine



✓ **Does not need a
state machine.**

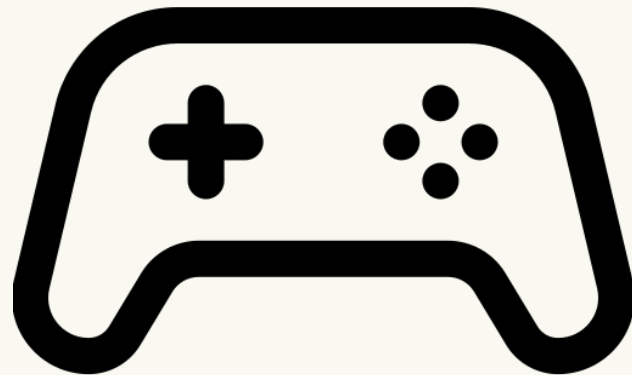
Frequent Animation
Transitions



✓ **Selection based on
pose + trajectory
features.**

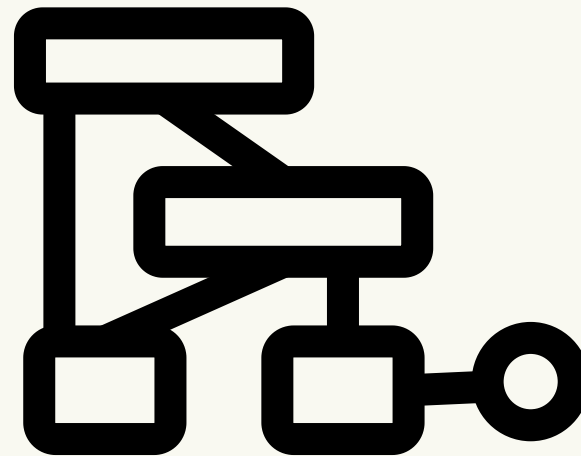
Locomotion Challenges/Motion Matching

Constantly changing inputs



✓ **Motion Matching can be run every frame.**

Complex state machine



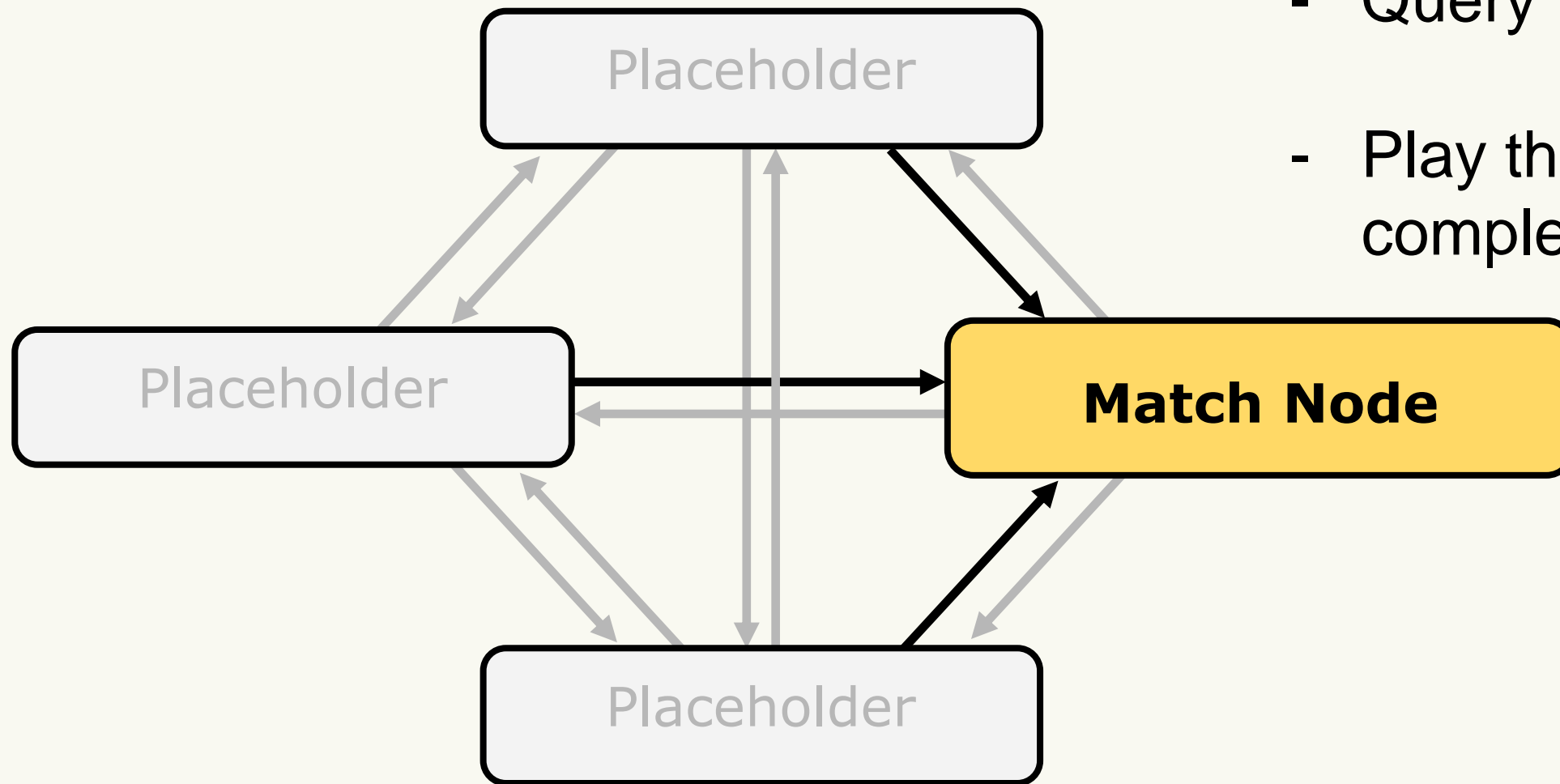
✓ **Does not need a state machine.**

Frequent Animation Transitions



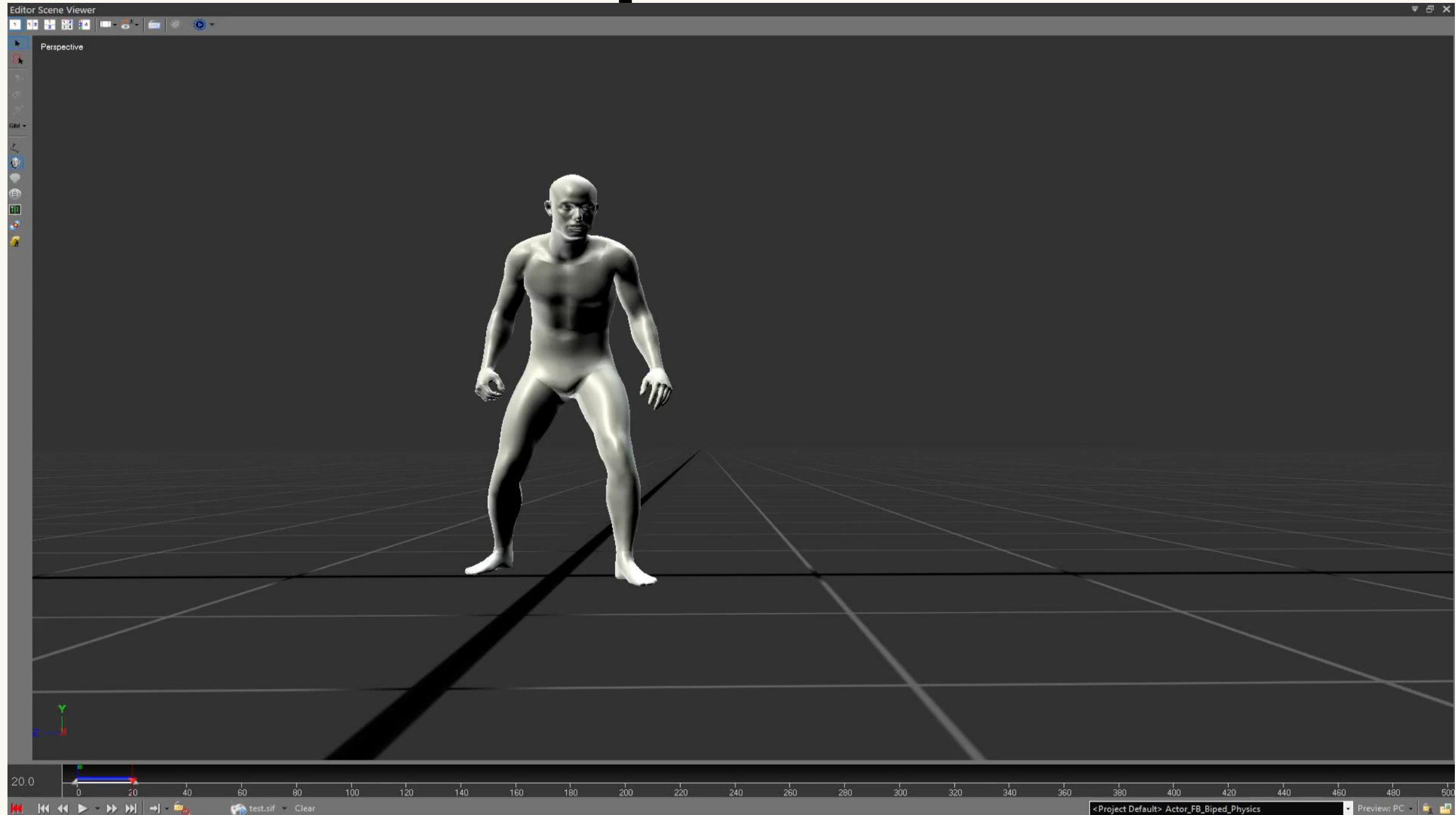
✓ **Selection based on pose + trajectory features.**

Match Node

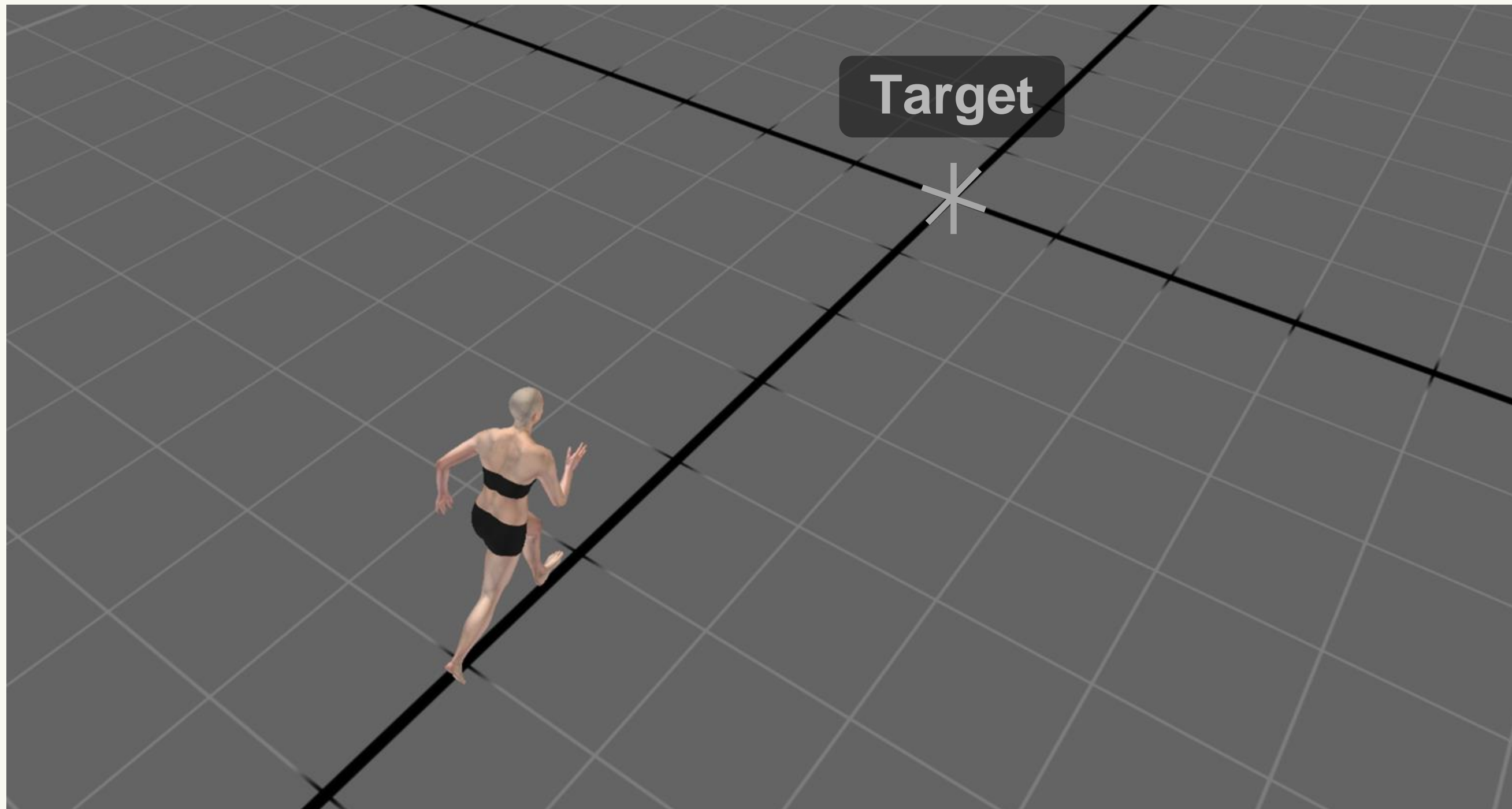


- Query from the MM database **upon entry**
- Play the asset from selected frame to completion

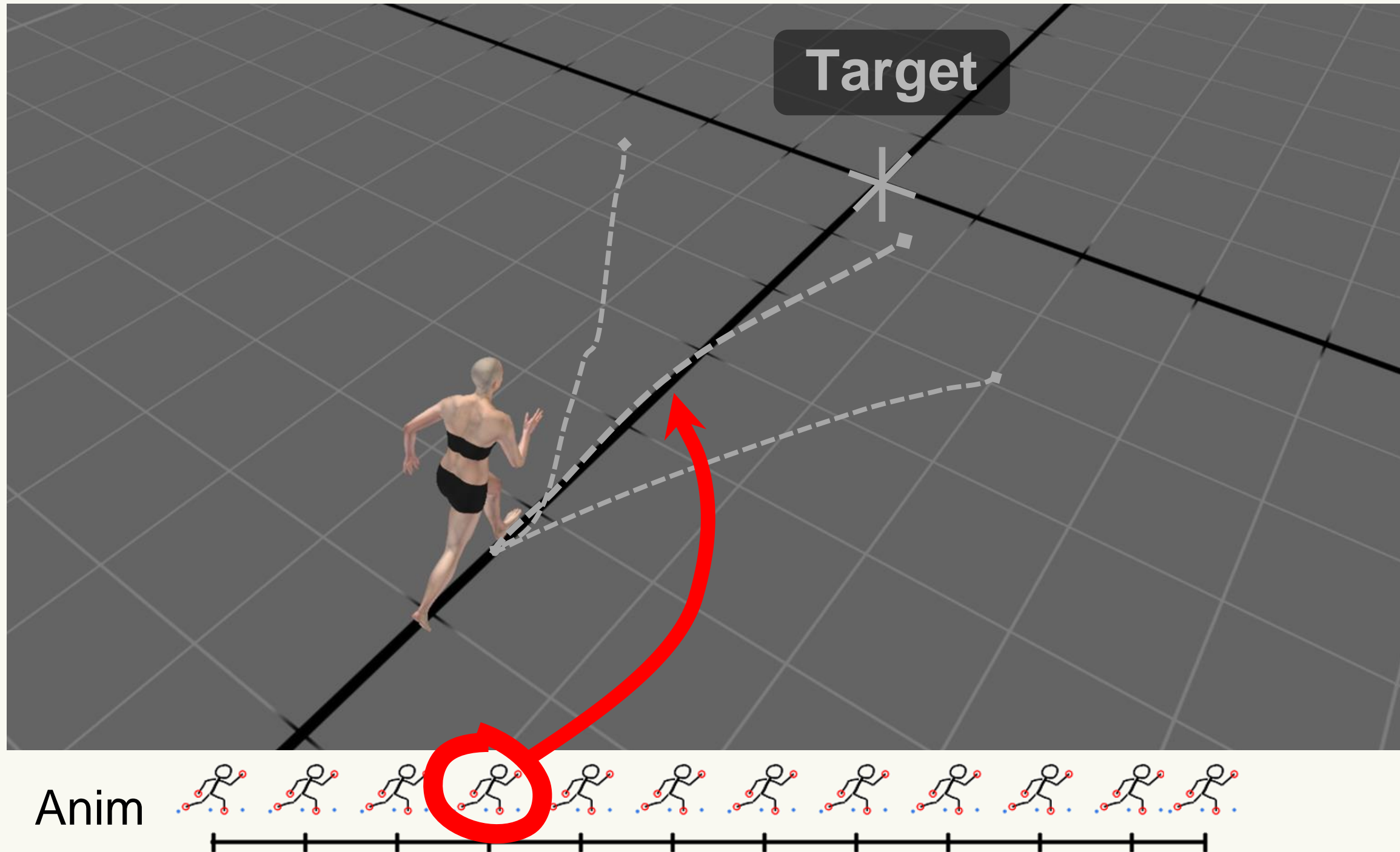
Match Node Example



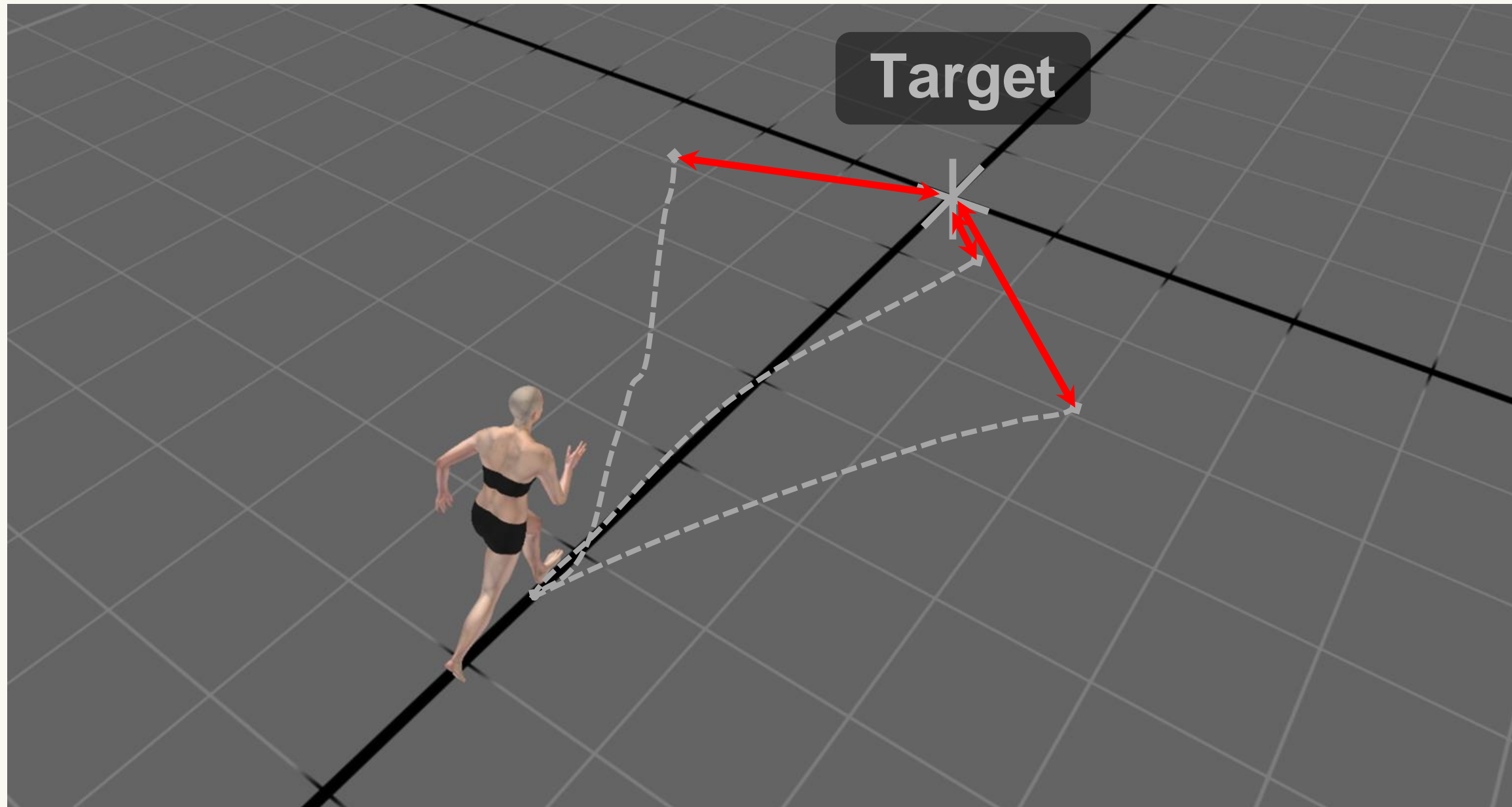
Warping To Target



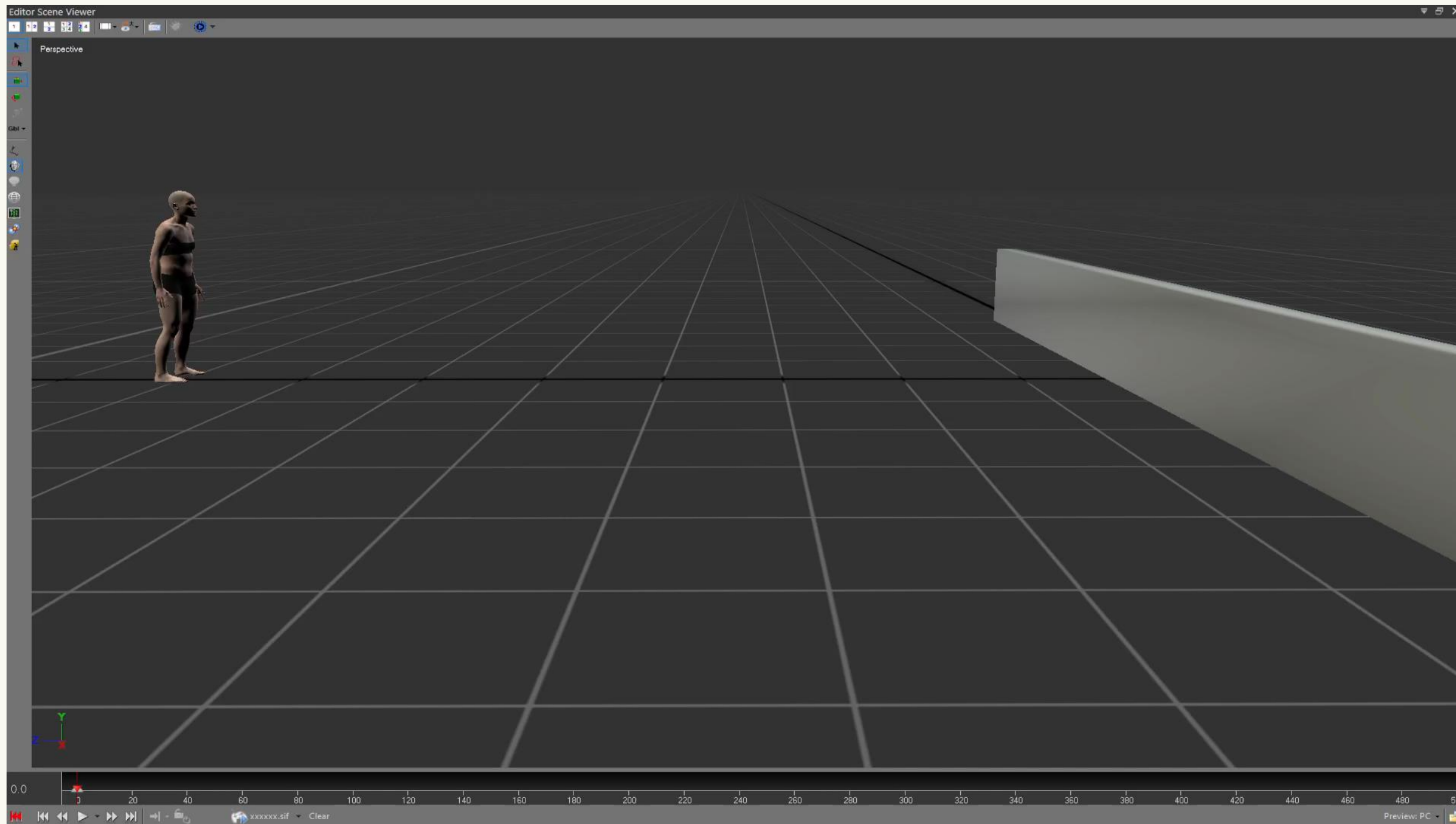
Candidate End Points



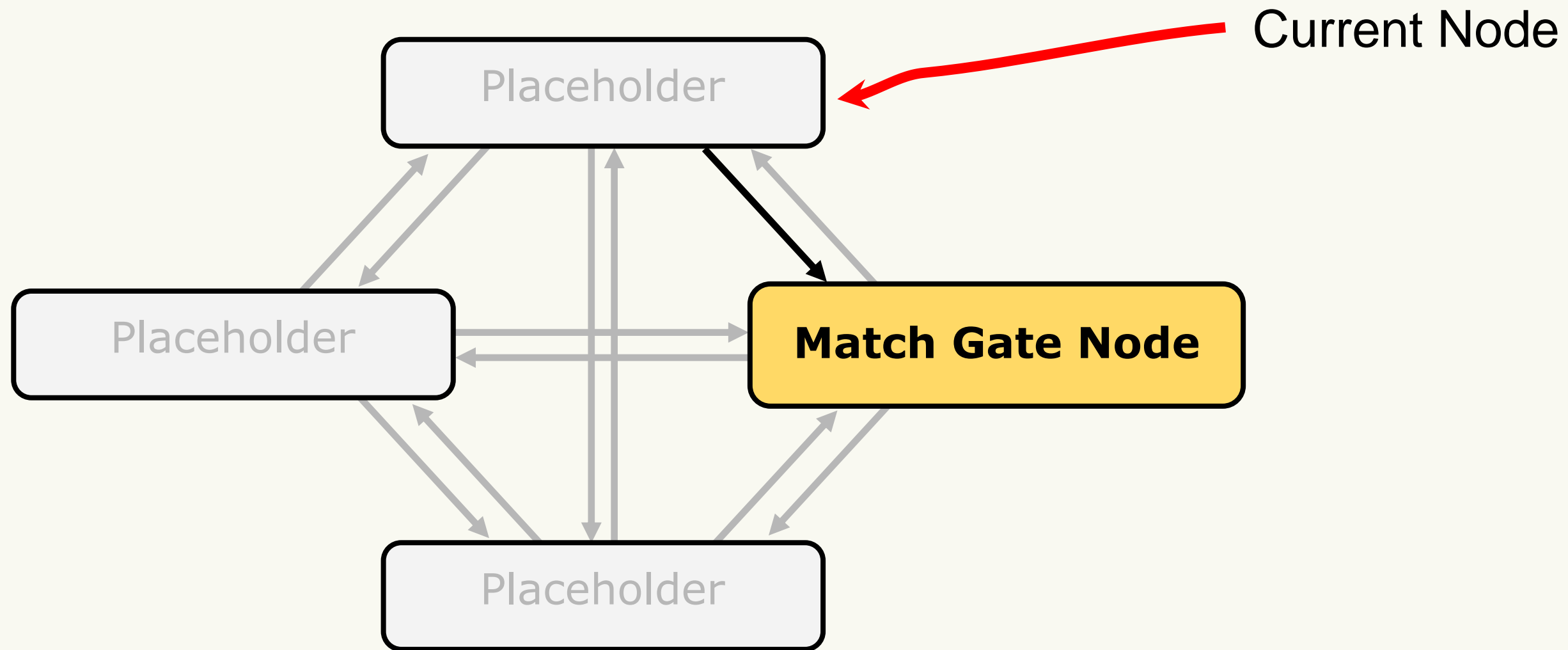
Distance To Target Cost



Match Node With Motion Warping

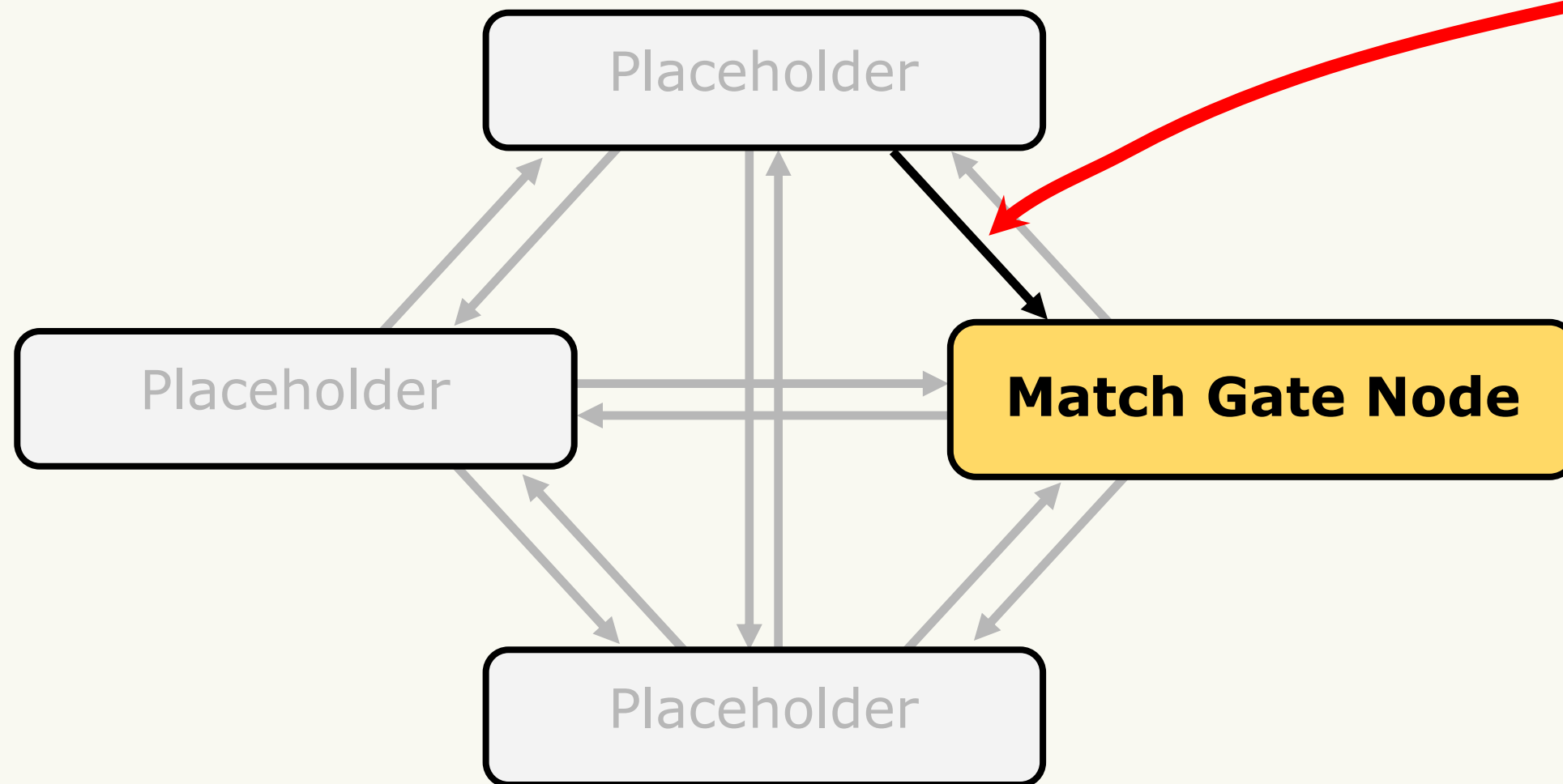


Match Gate Node

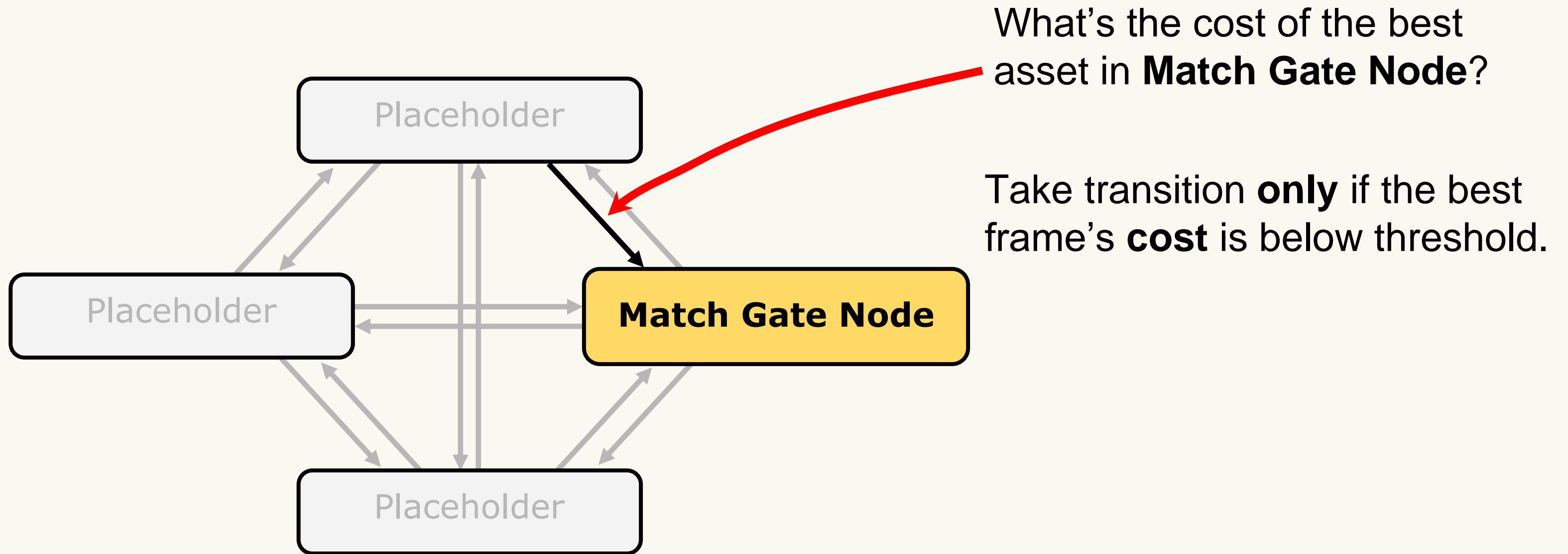


Match Gate Node

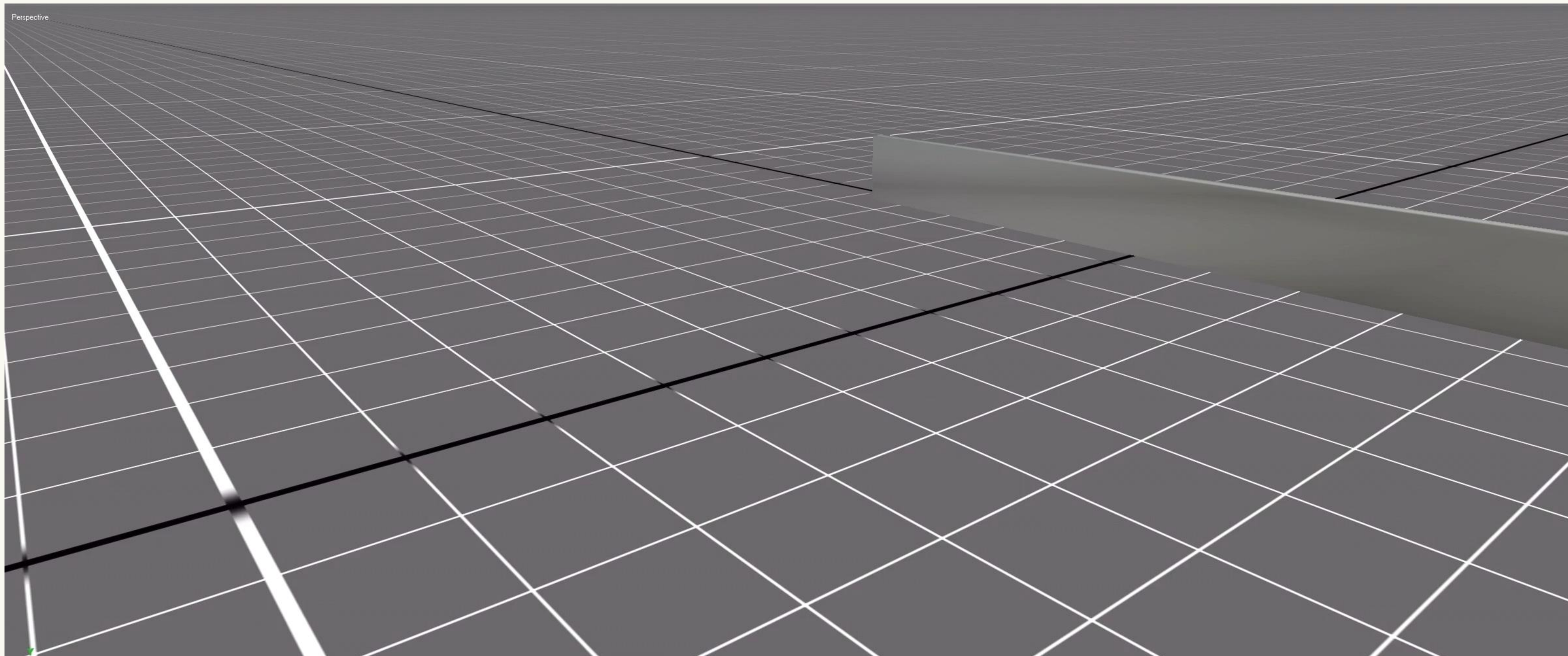
What's the cost of the best asset in **Match Gate Node**?



Match Gate Node

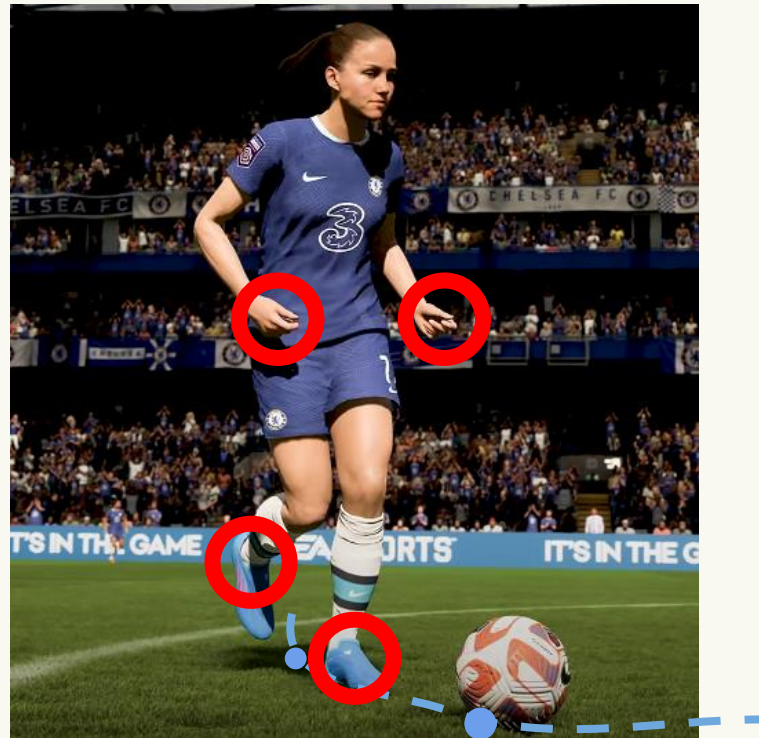


Combine it with entry animations

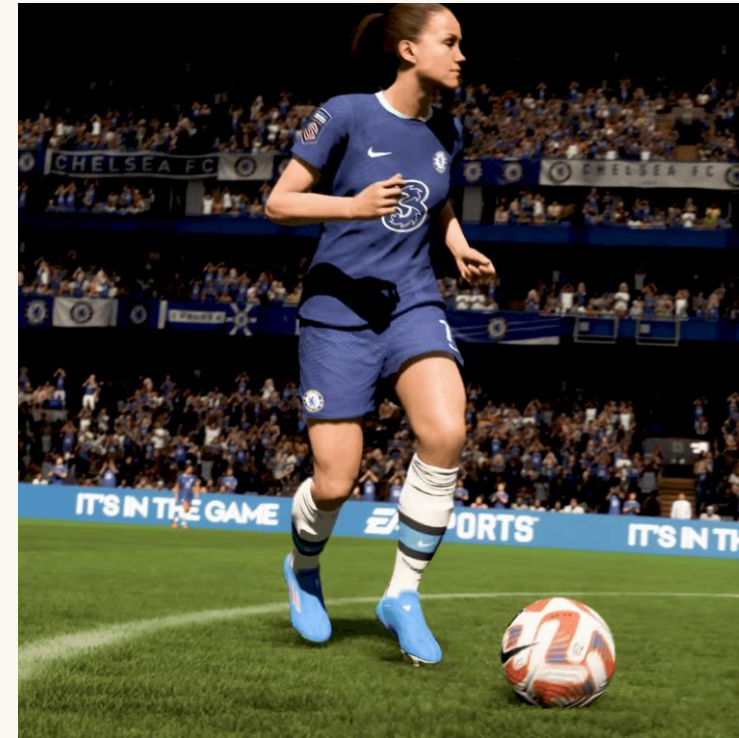


Animation Selection with MM

Easy to build datasets

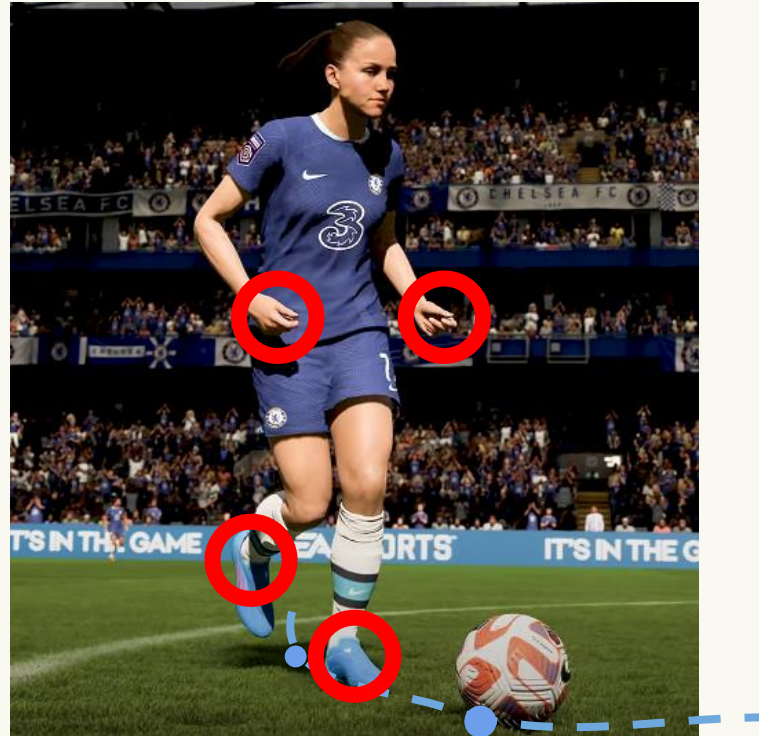


Great for asset selection

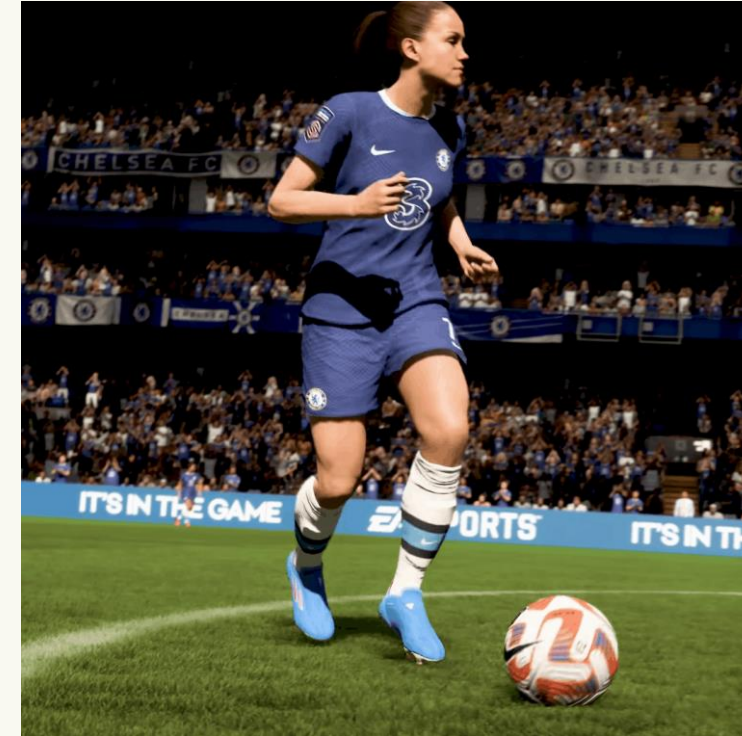


Animation Selection with MM

Easy to build datasets

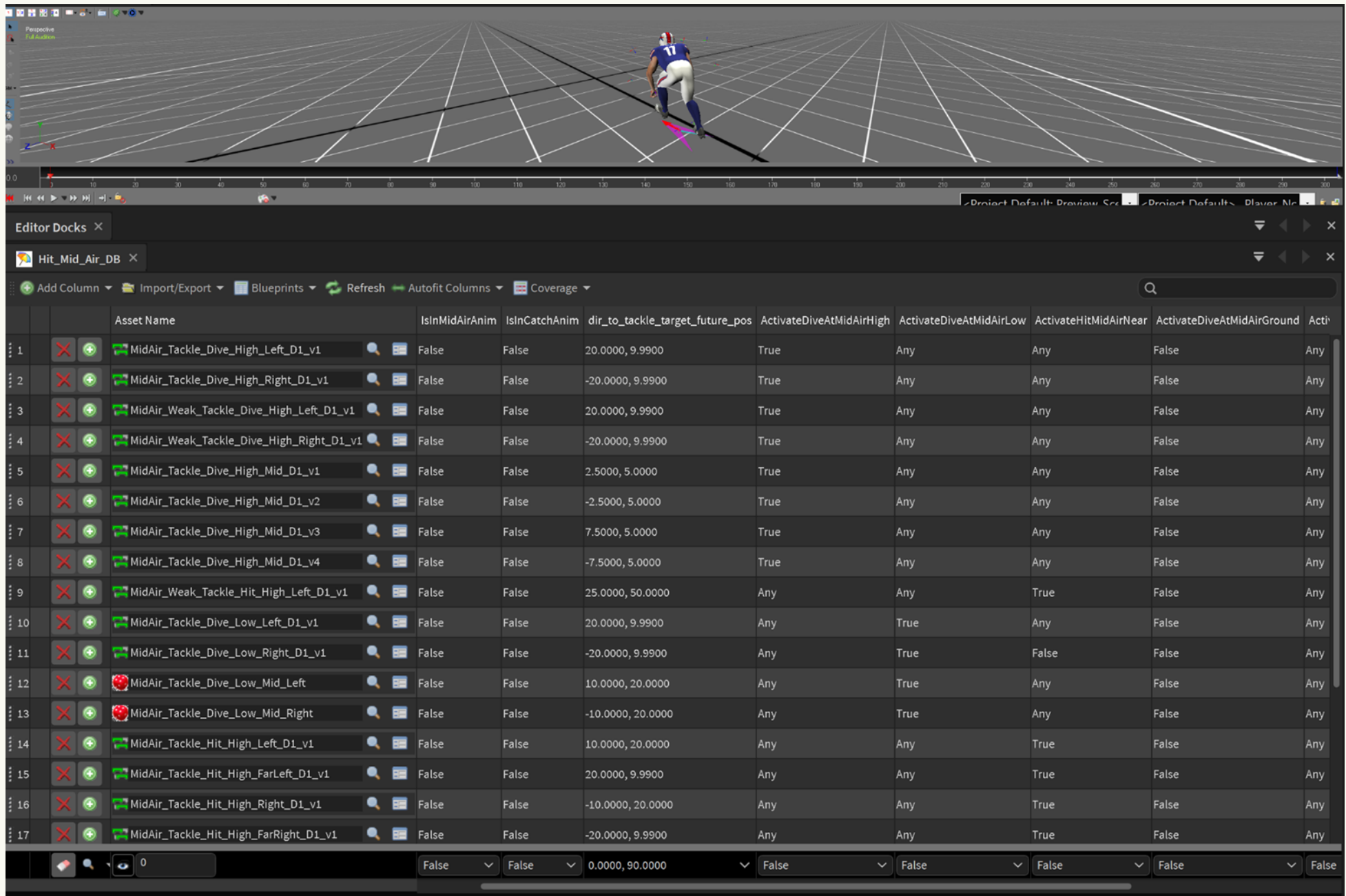


Great for asset selection



Doesn't handle conditions on game context.

Context Database



The screenshot shows a game engine editor interface. The top half displays a 3D perspective view of a player character in a blue and white uniform, positioned on a grid floor. The bottom half features an 'Editor Docks' panel with a table titled 'Hit_Mid_Air_DB'. The table lists 17 rows of context data, each with a unique asset name and various boolean and numerical values. The table includes columns for 'Asset Name', 'IsInMidAirAnim', 'IsInCatchAnim', 'dir_to_tackle_target_future_pos', and several 'Activate' flags. The bottom of the editor shows a search bar and a filter bar with dropdown menus.

		Asset Name	IsInMidAirAnim	IsInCatchAnim	dir_to_tackle_target_future_pos	ActivateDiveAtMidAirHigh	ActivateDiveAtMidAirLow	ActivateHitMidAirNear	ActivateDiveAtMidAirGround	Acti
1		MidAir_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
2		MidAir_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
3		MidAir_Weak_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
4		MidAir_Weak_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
5		MidAir_Tackle_Dive_High_Mid_D1_v1	False	False	2.5000, 5.0000	True	Any	Any	False	Any
6		MidAir_Tackle_Dive_High_Mid_D1_v2	False	False	-2.5000, 5.0000	True	Any	Any	False	Any
7		MidAir_Tackle_Dive_High_Mid_D1_v3	False	False	7.5000, 5.0000	True	Any	Any	False	Any
8		MidAir_Tackle_Dive_High_Mid_D1_v4	False	False	-7.5000, 5.0000	True	Any	Any	False	Any
9		MidAir_Weak_Tackle_Hit_High_Left_D1_v1	False	False	25.0000, 50.0000	Any	Any	True	False	Any
10		MidAir_Tackle_Dive_Low_Left_D1_v1	False	False	20.0000, 9.9900	Any	True	Any	False	Any
11		MidAir_Tackle_Dive_Low_Right_D1_v1	False	False	-20.0000, 9.9900	Any	True	False	False	Any
12		MidAir_Tackle_Dive_Low_Mid_Left	False	False	10.0000, 20.0000	Any	True	Any	False	Any
13		MidAir_Tackle_Dive_Low_Mid_Right	False	False	-10.0000, 20.0000	Any	True	Any	False	Any
14		MidAir_Tackle_Hit_High_Left_D1_v1	False	False	10.0000, 20.0000	Any	Any	True	False	Any
15		MidAir_Tackle_Hit_High_FarLeft_D1_v1	False	False	20.0000, 9.9900	Any	Any	True	False	Any
16		MidAir_Tackle_Hit_High_Right_D1_v1	False	False	-10.0000, 20.0000	Any	Any	True	False	Any
17		MidAir_Tackle_Hit_High_FarRight_D1_v1	False	False	-20.0000, 9.9900	Any	Any	True	False	Any

Context Database

Animations

		Asset Name	IsMidAirAnim	IsInCatchAnim	dir_to_tackle_target_future_pos	ActivateDiveAtMidAirHigh	ActivateDiveAtMidAirLow	ActivateHitMidAirNear	ActivateDiveAtMidAirGround	Acti			
1					MidAir_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
2					MidAir_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
3					MidAir_Weak_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
4					MidAir_Weak_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
5					MidAir_Tackle_Dive_High_Mid_D1_v1	False	False	2.5000, 5.0000	True	Any	Any	False	Any
6					MidAir_Tackle_Dive_High_Mid_D1_v2	False	False	-2.5000, 5.0000	True	Any	Any	False	Any
7					MidAir_Tackle_Dive_High_Mid_D1_v3	False	False	7.5000, 5.0000	True	Any	Any	False	Any
8					MidAir_Tackle_Dive_High_Mid_D1_v4	False	False	-7.5000, 5.0000	True	Any	Any	False	Any
9					MidAir_Weak_Tackle_Hit_High_Left_D1_v1	False	False	25.0000, 50.0000	Any	Any	True	False	Any
10					MidAir_Tackle_Dive_Low_Left_D1_v1	False	False	20.0000, 9.9900	Any	True	Any	False	Any
11					MidAir_Tackle_Dive_Low_Right_D1_v1	False	False	-20.0000, 9.9900	Any	True	False	False	Any
12					MidAir_Tackle_Dive_Low_Mid_Left	False	False	10.0000, 20.0000	Any	True	Any	False	Any
13					MidAir_Tackle_Dive_Low_Mid_Right	False	False	-10.0000, 20.0000	Any	True	Any	False	Any
14					MidAir_Tackle_Hit_High_Left_D1_v1	False	False	10.0000, 20.0000	Any	Any	True	False	Any
15					MidAir_Tackle_Hit_High_FarLeft_D1_v1	False	False	20.0000, 9.9900	Any	Any	True	False	Any
16					MidAir_Tackle_Hit_High_Right_D1_v1	False	False	-10.0000, 20.0000	Any	Any	True	False	Any
17					MidAir_Tackle_Hit_High_FarRight_D1_v1	False	False	-20.0000, 9.9900	Any	Any	True	False	Any

Context Database

Conditions

		Asset Name	IsInMidAirAnim	IsInCatchAnim	dir_to_tackle_target_future_pos	ActivateDiveAtMidAirHigh	ActivateDiveAtMidAirLow	ActivateHitMidAirNear	ActivateDiveAtMidAirGround	Acti
1		MidAir_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
2		MidAir_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
3		MidAir_Weak_Tackle_Dive_High_Left_D1_v1	False	False	20.0000, 9.9900	True	Any	Any	False	Any
4		MidAir_Weak_Tackle_Dive_High_Right_D1_v1	False	False	-20.0000, 9.9900	True	Any	Any	False	Any
5		MidAir_Tackle_Dive_High_Mid_D1_v1	False	False	2.5000, 5.0000	True	Any	Any	False	Any
6		MidAir_Tackle_Dive_High_Mid_D1_v2	False	False	-2.5000, 5.0000	True	Any	Any	False	Any
7		MidAir_Tackle_Dive_High_Mid_D1_v3	False	False	7.5000, 5.0000	True	Any	Any	False	Any
8		MidAir_Tackle_Dive_High_Mid_D1_v4	False	False	-7.5000, 5.0000	True	Any	Any	False	Any
9		MidAir_Weak_Tackle_Hit_High_Left_D1_v1	False	False	25.0000, 50.0000	Any	Any	True	False	Any
10		MidAir_Tackle_Dive_Low_Left_D1_v1	False	False	20.0000, 9.9900	Any	True	Any	False	Any
11		MidAir_Tackle_Dive_Low_Right_D1_v1	False	False	-20.0000, 9.9900	Any	True	False	False	Any
12		MidAir_Tackle_Dive_Low_Mid_Left	False	False	10.0000, 20.0000	Any	True	Any	False	Any
13		MidAir_Tackle_Dive_Low_Mid_Right	False	False	-10.0000, 20.0000	Any	True	Any	False	Any
14		MidAir_Tackle_Hit_High_Left_D1_v1	False	False	10.0000, 20.0000	Any	Any	True	False	Any
15		MidAir_Tackle_Hit_High_FarLeft_D1_v1	False	False	20.0000, 9.9900	Any	Any	True	False	Any
16		MidAir_Tackle_Hit_High_Right_D1_v1	False	False	-10.0000, 20.0000	Any	Any	True	False	Any
17		MidAir_Tackle_Hit_High_FarRight_D1_v1	False	False	-20.0000, 9.9900	Any	Any	True	False	Any
			False	False	0.0000, 90.0000	False	False	False	False	False

MM Linked With Context Database

Motion Matching

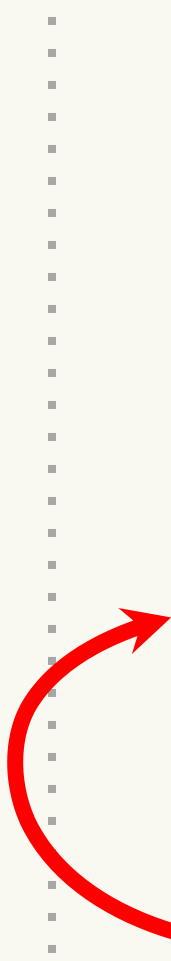
Context Database

ControllersOptionsPriorities											
Add ColumnImport ExportBlueprintsRefreshAutofit ColumnsCoverage											
		Asset Name	Mandatory_Slots	Optional_Slots	MidAir_MidAir_Catch_Direction	Defender.DepthCha	Defender.MidAir_	Defender.Catchir	Defender.Catching	Defe	
1		D3_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True	
3		D3_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
4		D5_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
5		D5_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
6		D5_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
7		D6_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
8		D6_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
9		D6_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
10		D6_Contested_MidAir_Catch_90_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
11		D8_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
12		D8_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
13		D8_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
15		D3_Contested_MidAir_Catch_135_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
16		D3_Contested_MidAir_Catch_135_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	
18		D4_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True	

MM Linked With Context Database

Motion Matching

Context Database



	Asset Name	Mandatory_Slots	Optional_Slots	MidAir_MidAir_Catch_Direction	Defender.DepthCha	Defender.MidAir_	Defender.Catchir	Defender.Catching	Defe
1	D3_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
2	D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
3	D3_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
4	D5_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
5	D5_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
6	D5_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
7	D6_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
8	D6_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
9	D6_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
10	D6_Contested_MidAir_Catch_90_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
11	D6_Contested_MidAir_Catch_90_V5_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
12	D8_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
13	D8_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14	D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
15	D3_Contested_MidAir_Catch_135_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
16	D3_Contested_MidAir_Catch_135_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17	D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
18	D4_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True

valid animations

MM Linked With Context Database

Motion Matching

2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
10		D6_Contested_MidAir_Catch_90_v4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True

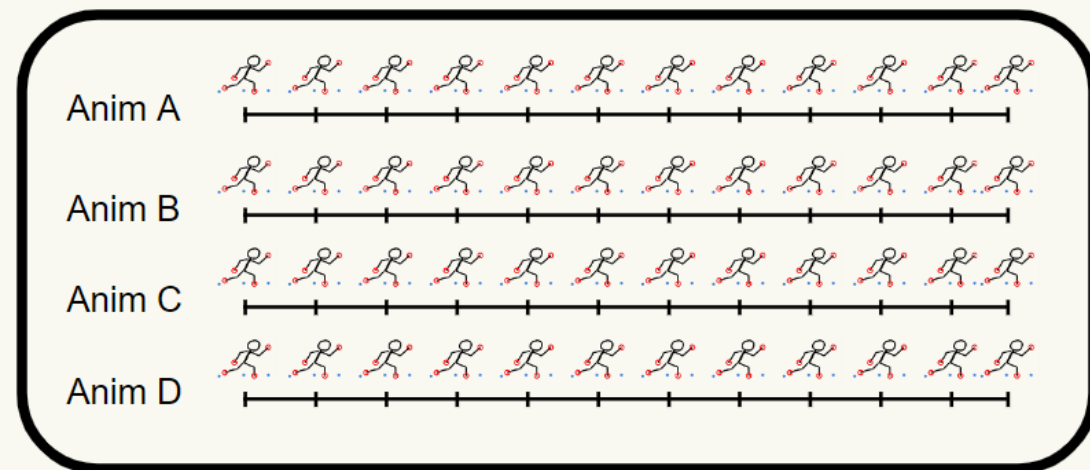
Context Database

Asset Name	Mandatory_Slots	Optional_Slots	MidAir_MidAir_Catch_Direction	Defender.DepthCha	Defender.MidAir_	Defender.Catchir	Defender.Catching	Defe
D3_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D5_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D5_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D6_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D6_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D6_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D6_Contested_MidAir_Catch_90_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D6_Contested_MidAir_Catch_90_V5_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D8_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D8_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_135_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_135_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
D4_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True

MM Linked With Context Database

Motion Matching

2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
10		D6_Contested_MidAir_Catch_90_v4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True



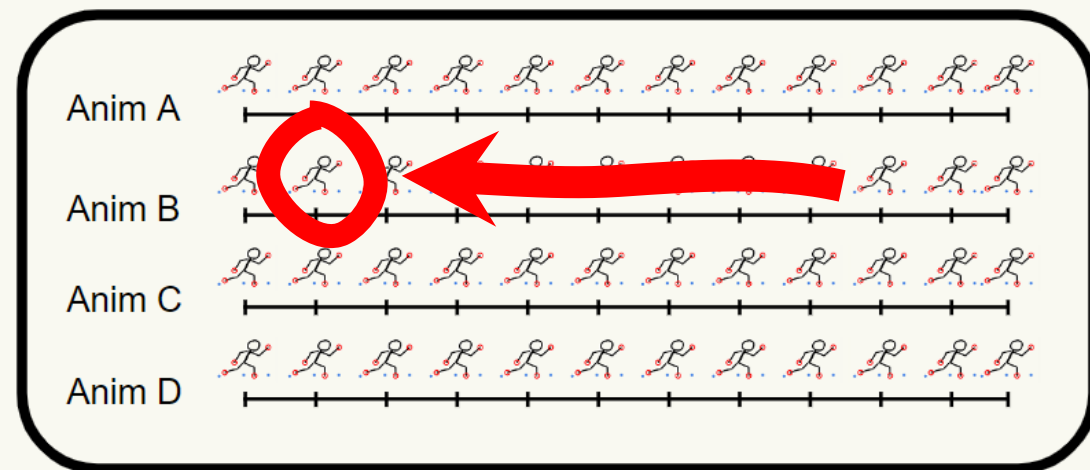
Context Database

Controllers Options Priorities										
		Asset Name	Mandatory_Slots	Optional_Slots	MidAir_MidAir_Catch_Direction	Defender.DepthCha	Defender.MidAir_	Defender.Catchir	Defender.Catching	Defe
1		D3_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
3		D3_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
4		D5_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
5		D5_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
6		D5_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
7		D6_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
8		D6_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
9		D6_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
10		D6_Contested_MidAir_Catch_90_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
11		D6_Contested_MidAir_Catch_90_V5_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
12		D8_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
13		D8_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
15		D3_Contested_MidAir_Catch_135_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
16		D3_Contested_MidAir_Catch_135_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
18		D4_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True

MM Linked With Context Database

Motion Matching

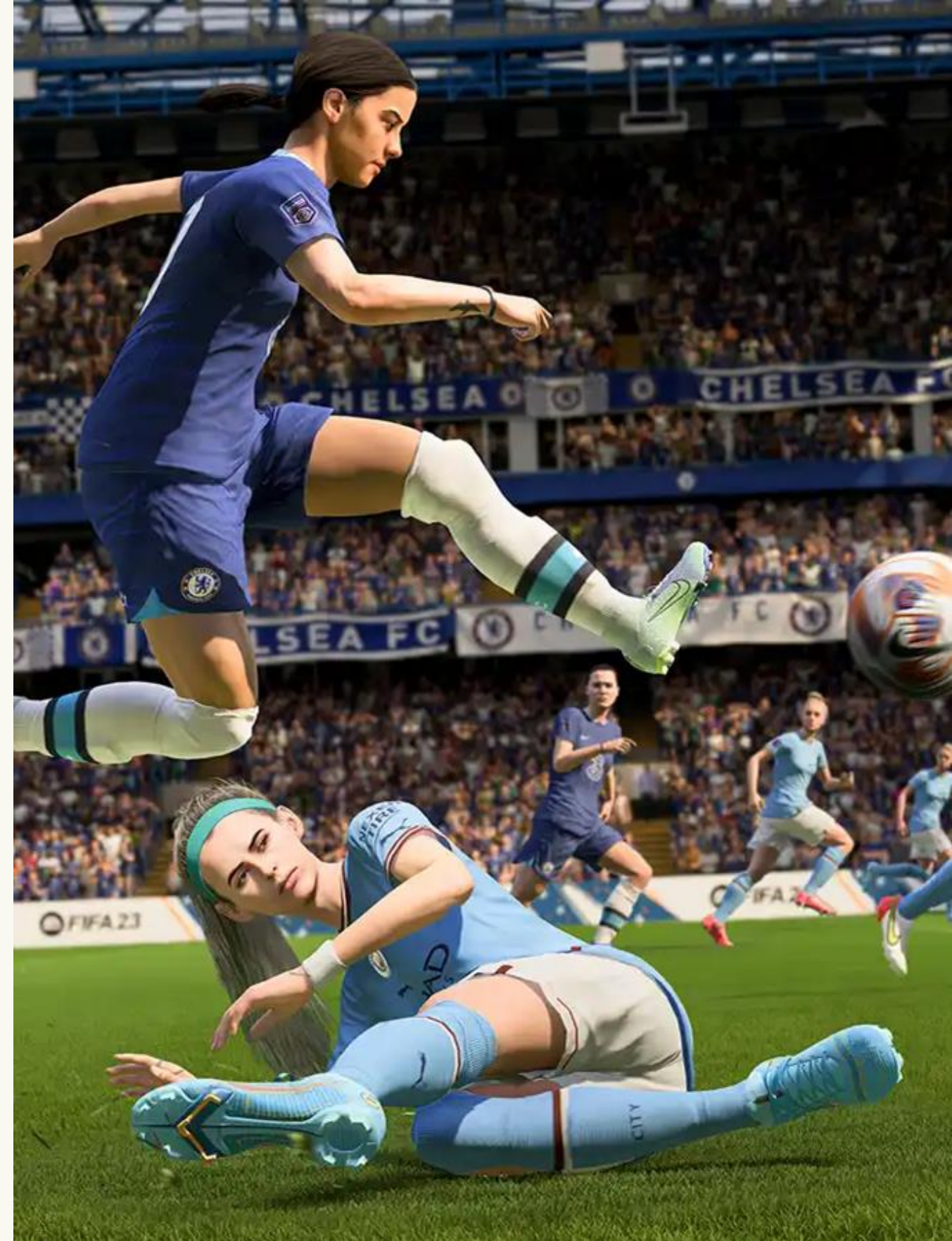
2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
10		D6_Contested_MidAir_Catch_90_v4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True



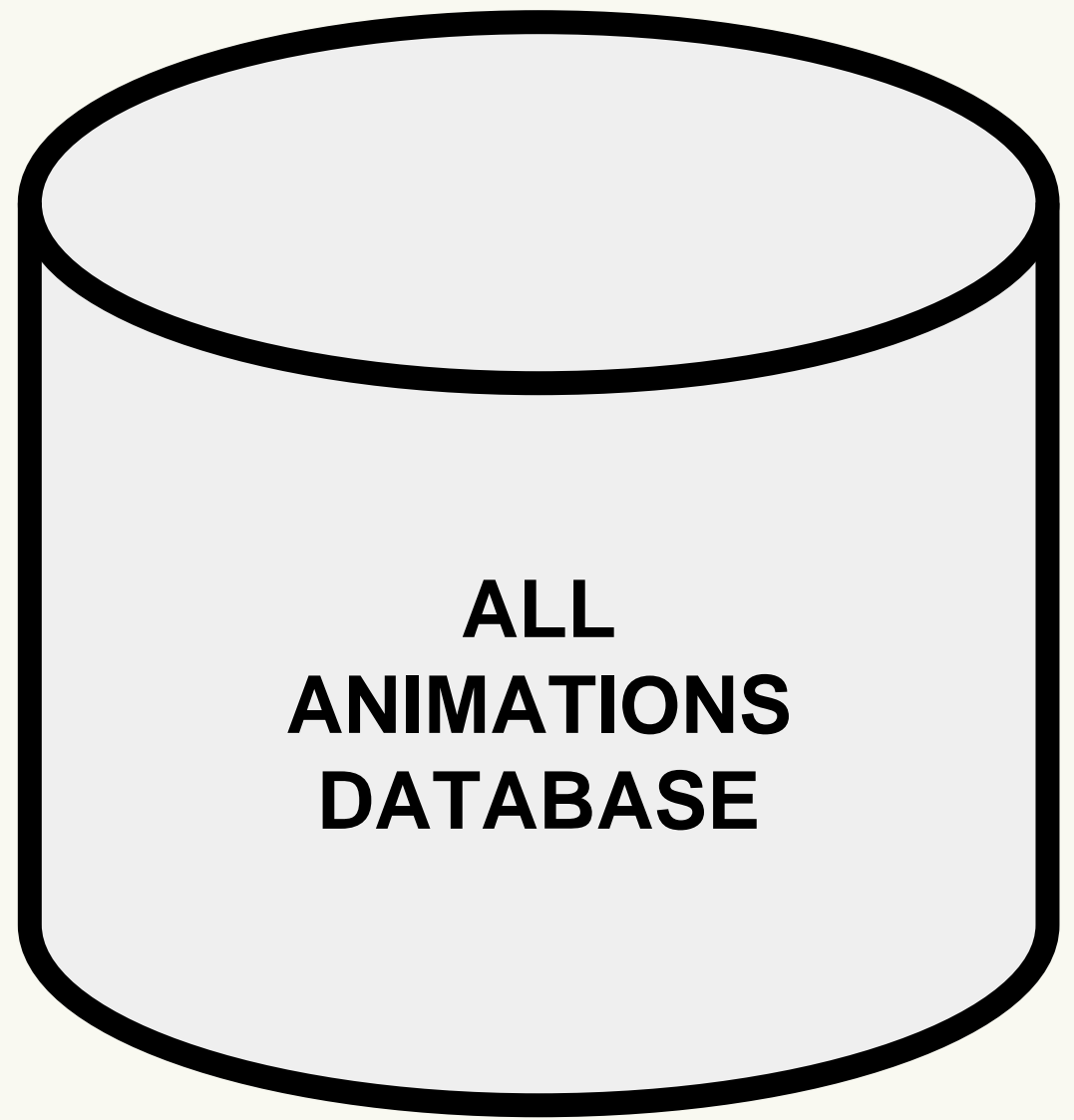
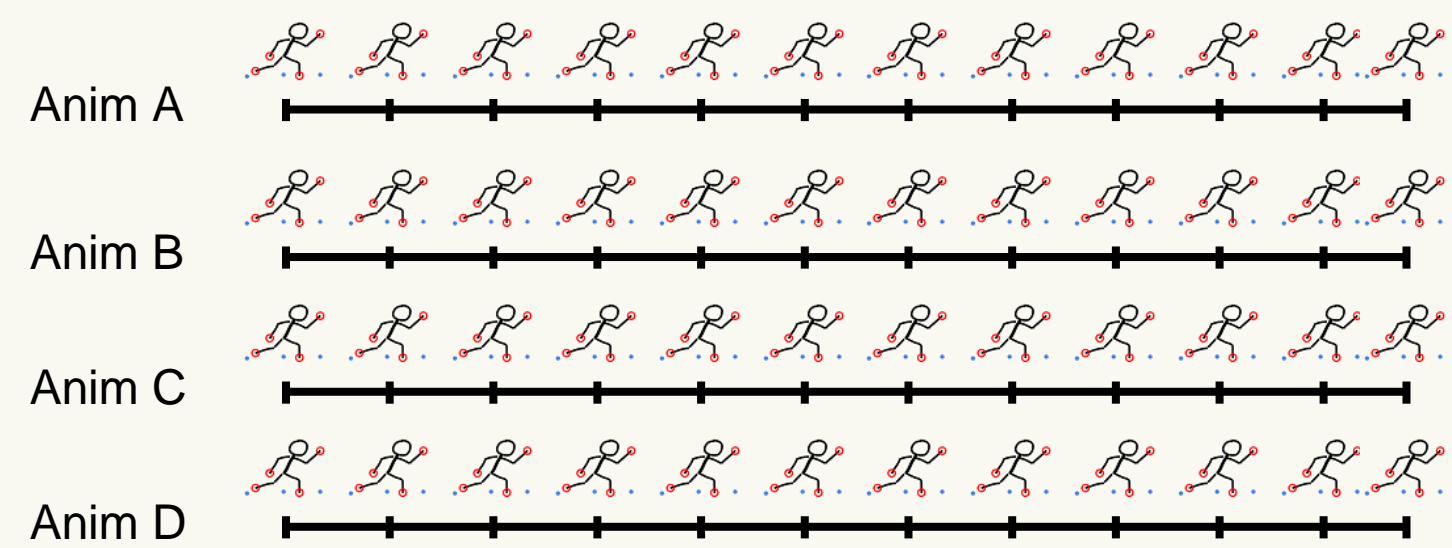
Context Database

Controllers Options Priorities										
		Asset Name	Mandatory_Slots	Optional_Slots	MidAir_MidAir_Catch_Direction	Defender.DepthCha	Defender.MidAir_	Defender.Catchir	Defender.Catching	Defe
1		D3_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
2		D3_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Down	CB FS SS	True	Any	Any	True
3		D3_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
4		D5_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
5		D5_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
6		D5_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
7		D6_Contested_MidAir_Catch_90_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
8		D6_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
9		D6_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
10		D6_Contested_MidAir_Catch_90_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
11		D6_Contested_MidAir_Catch_90_V5_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
12		D8_Contested_MidAir_Catch_90_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
13		D8_Contested_MidAir_Catch_90_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
14		D3_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
15		D3_Contested_MidAir_Catch_135_V2_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
16		D3_Contested_MidAir_Catch_135_V3_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
17		D3_Contested_MidAir_Catch_135_V4_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True
18		D4_Contested_MidAir_Catch_135_V1_ScenarioController	Embed	Embed	Going_Up Top	CB FS SS	True	Any	Any	True

2. Organizing Your Data



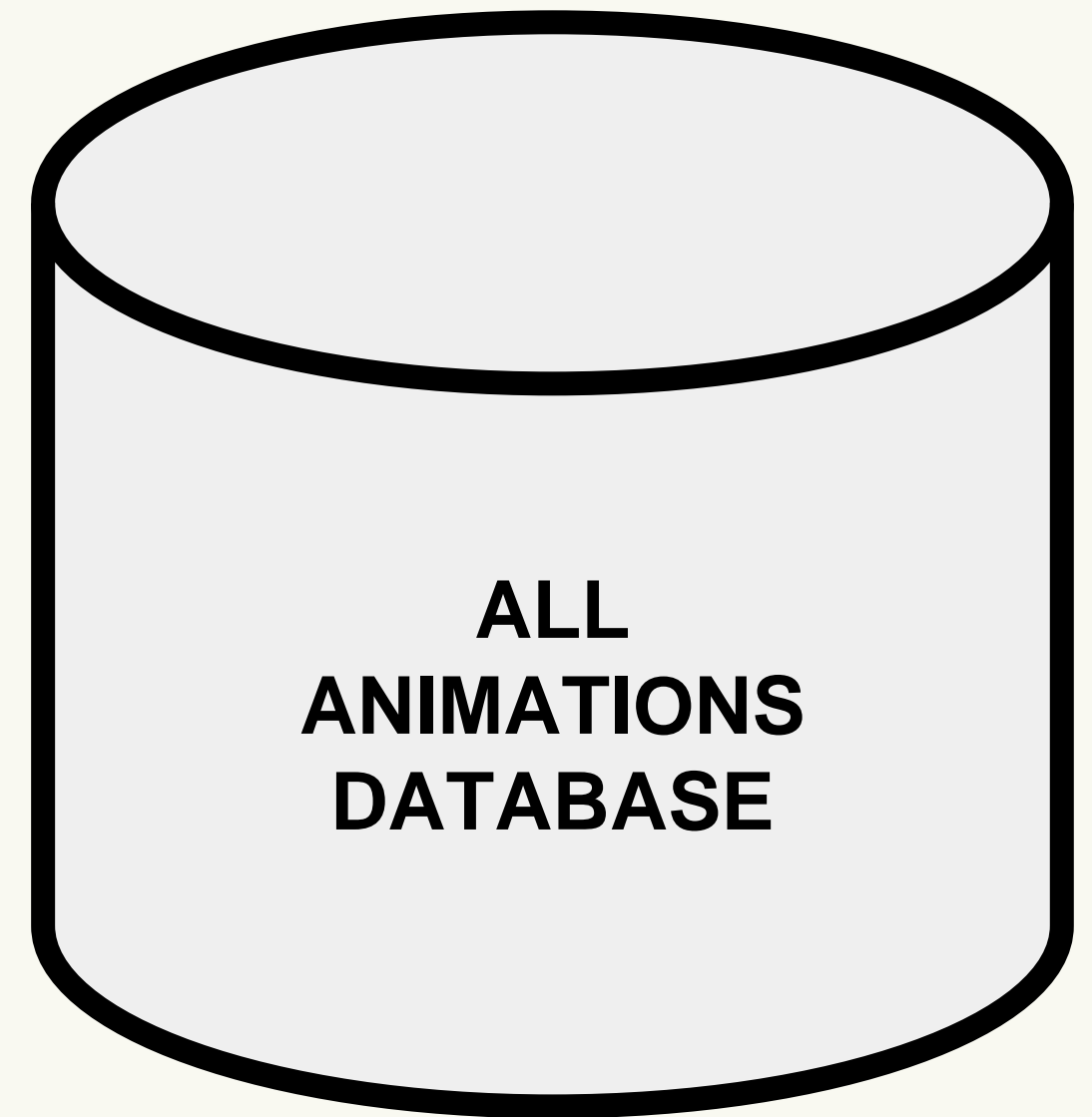
Organizing Your Data



Organizing Your Data

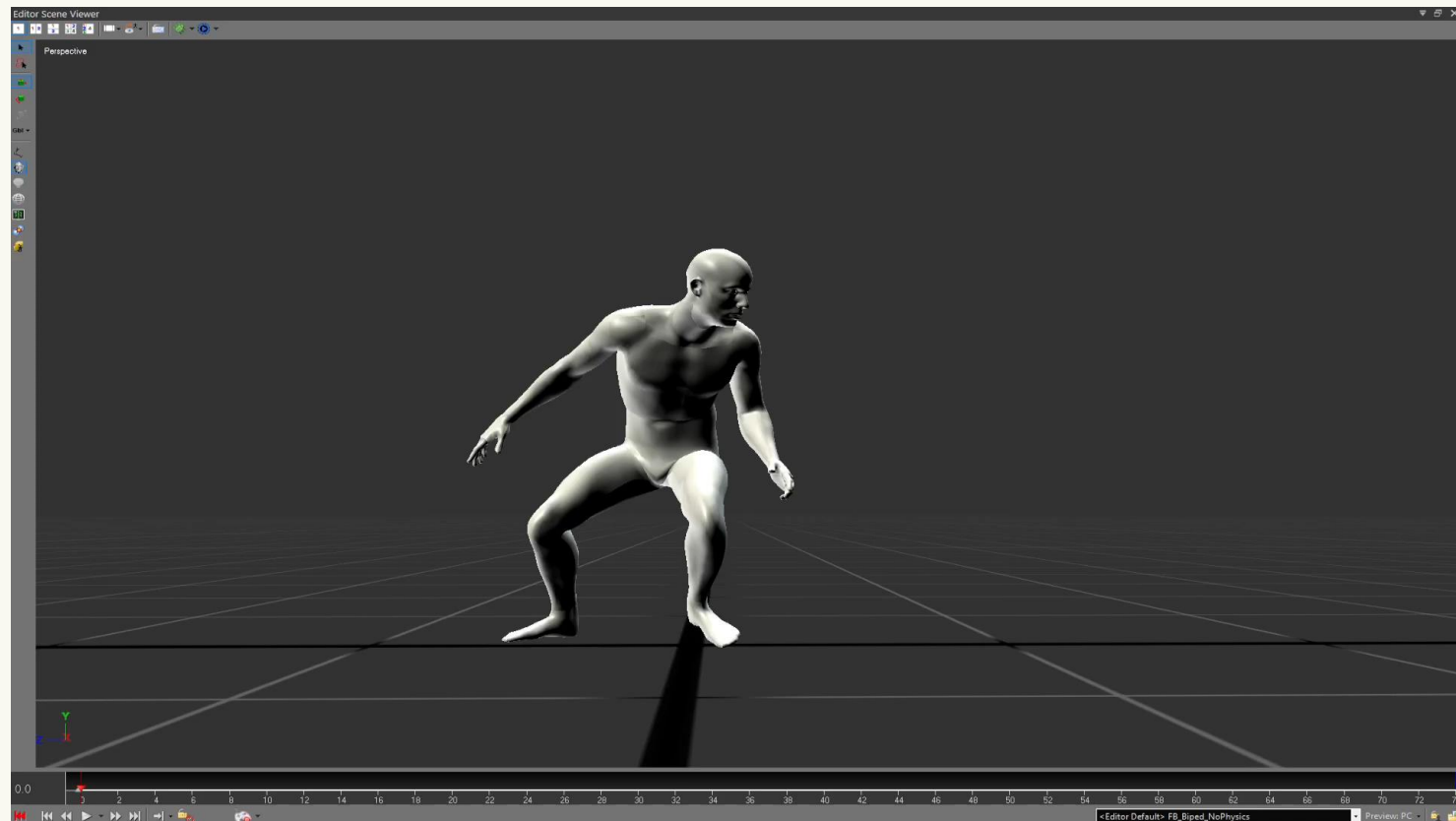
Problems

- So much complexity in a single place
- Difficult to get the desired frame to play since some assets are very similar

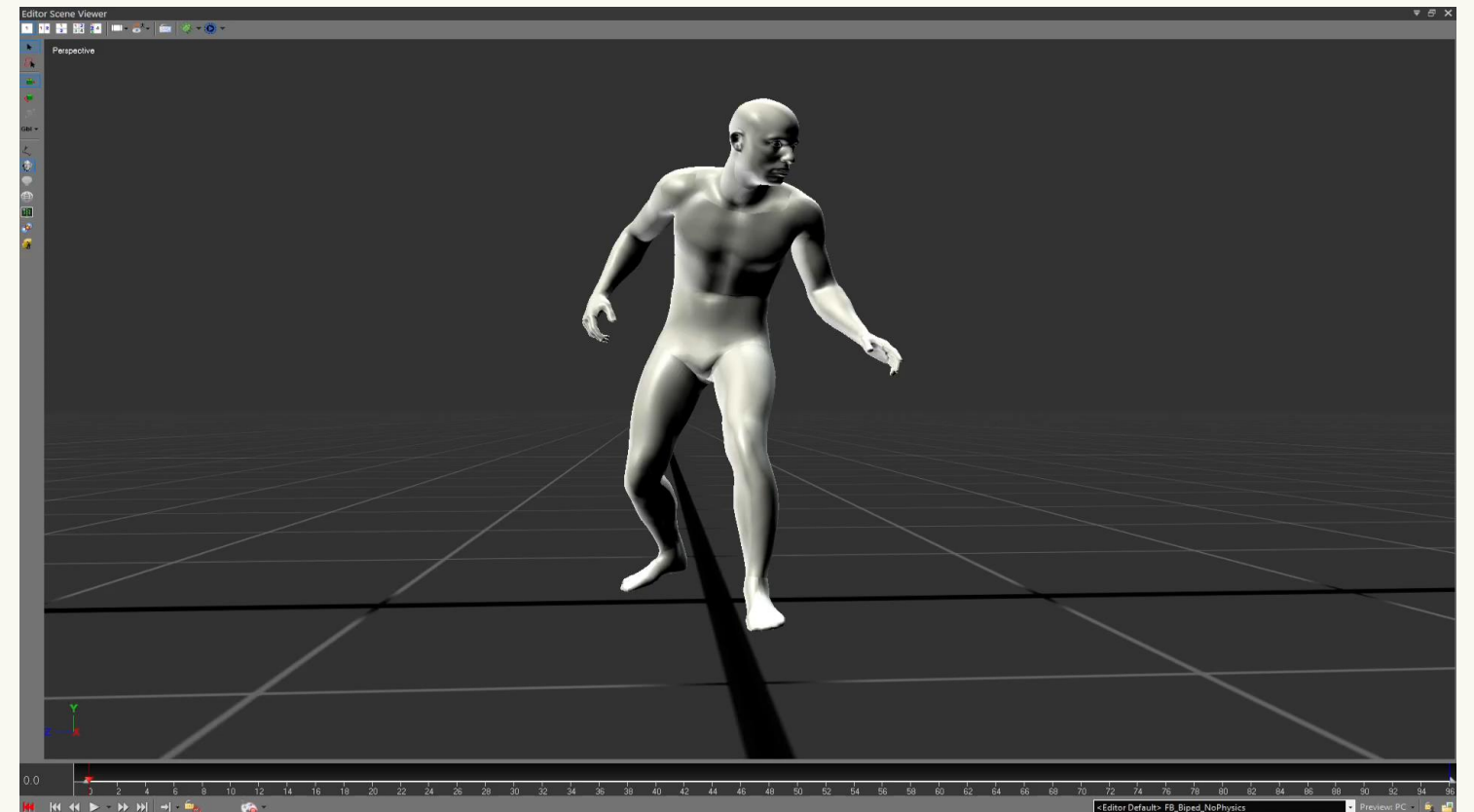


Pop Quiz

Start animation or **acceleration** from turn?



A



B

Pop Quiz

Start animation or **acceleration** from turn?



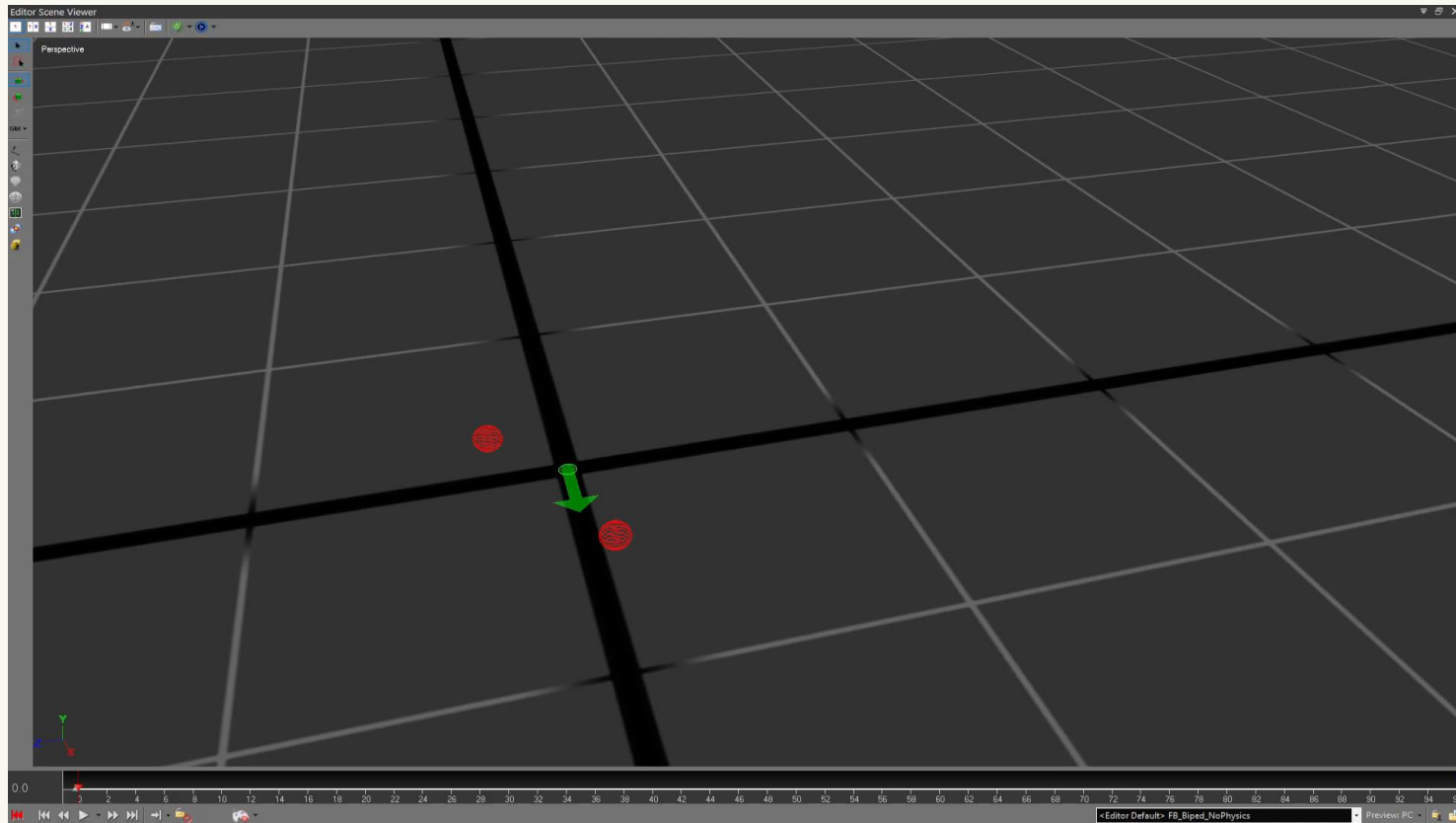
A



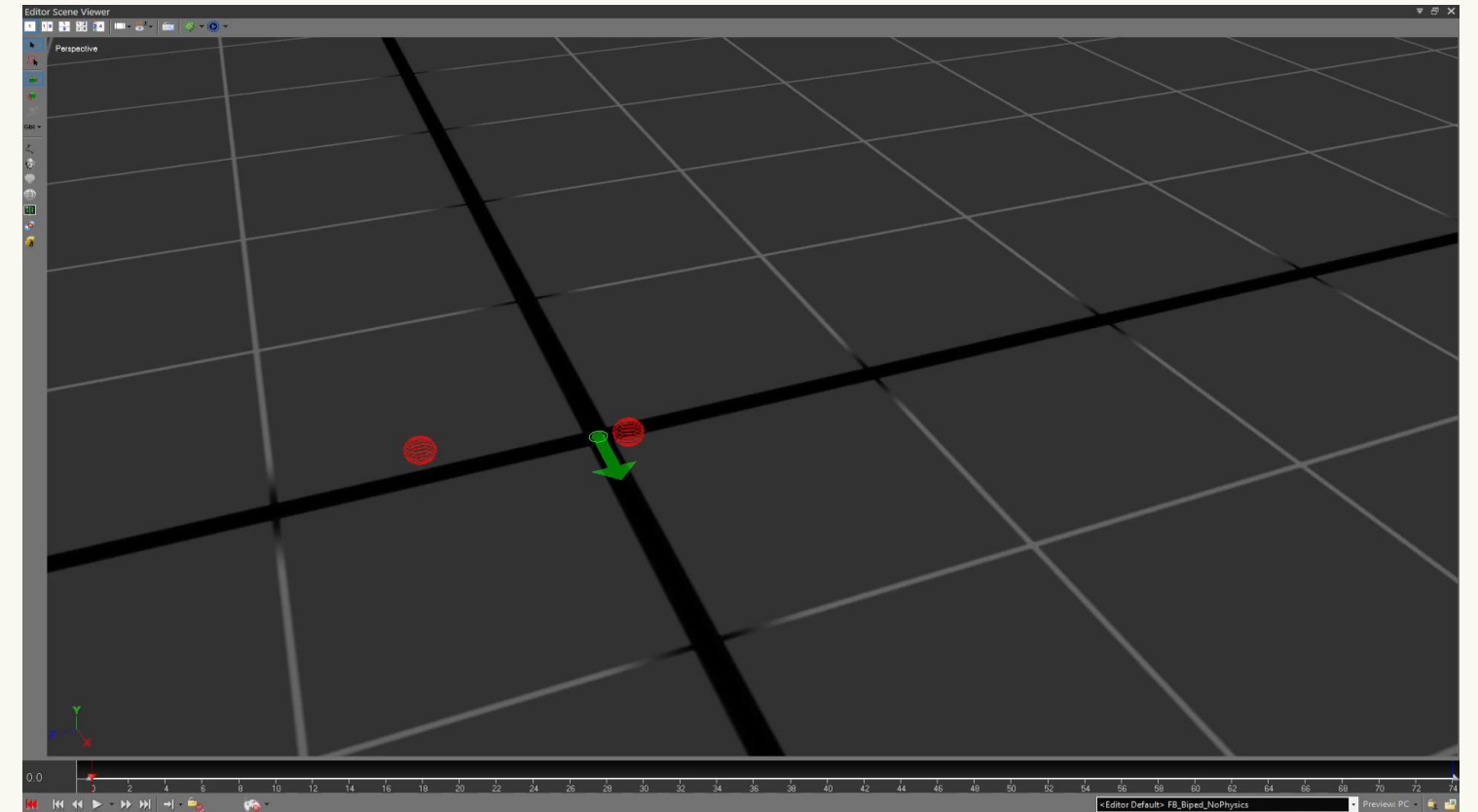
B

Pop Quiz +

Start animation or acceleration from turn?



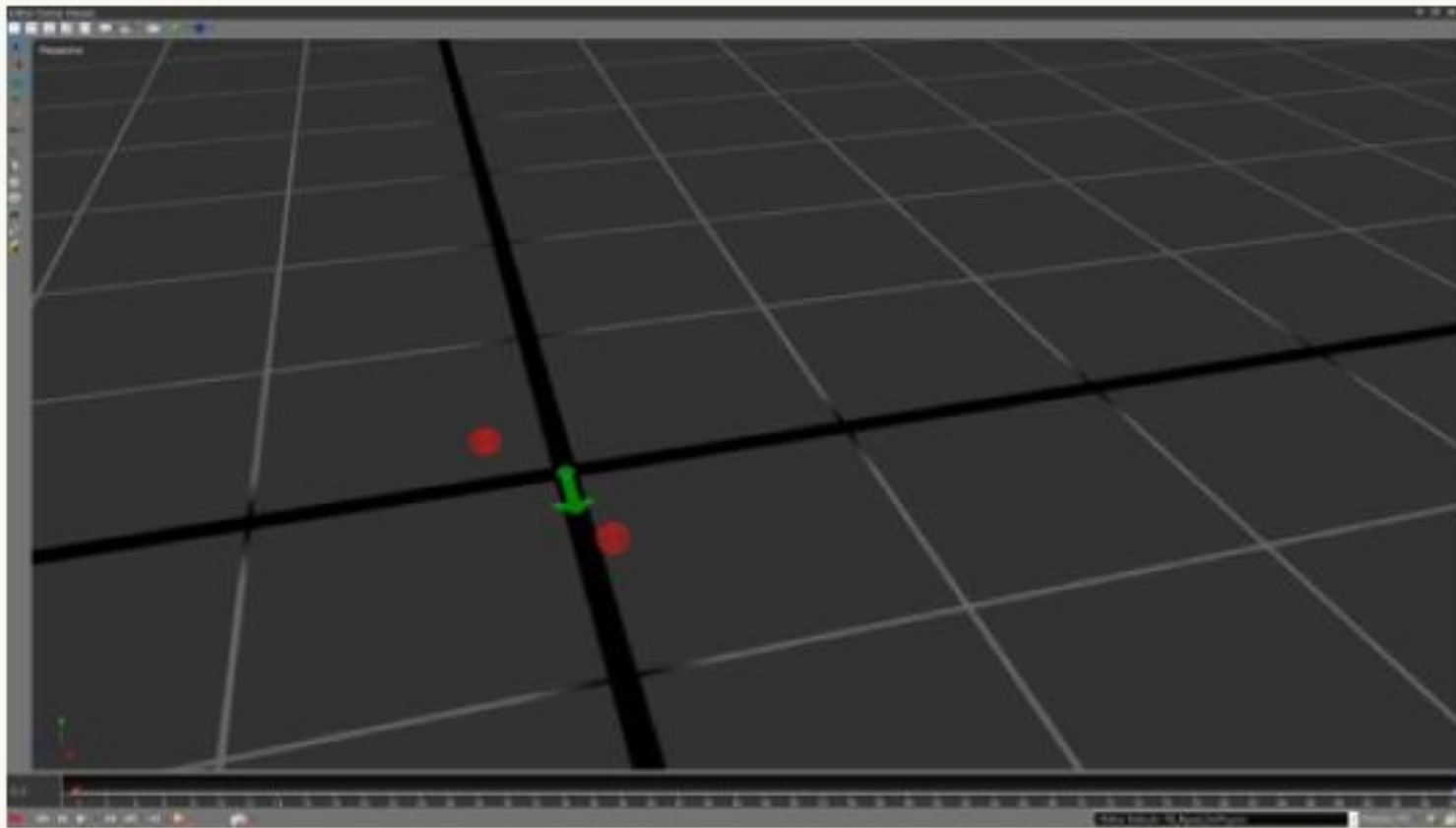
X



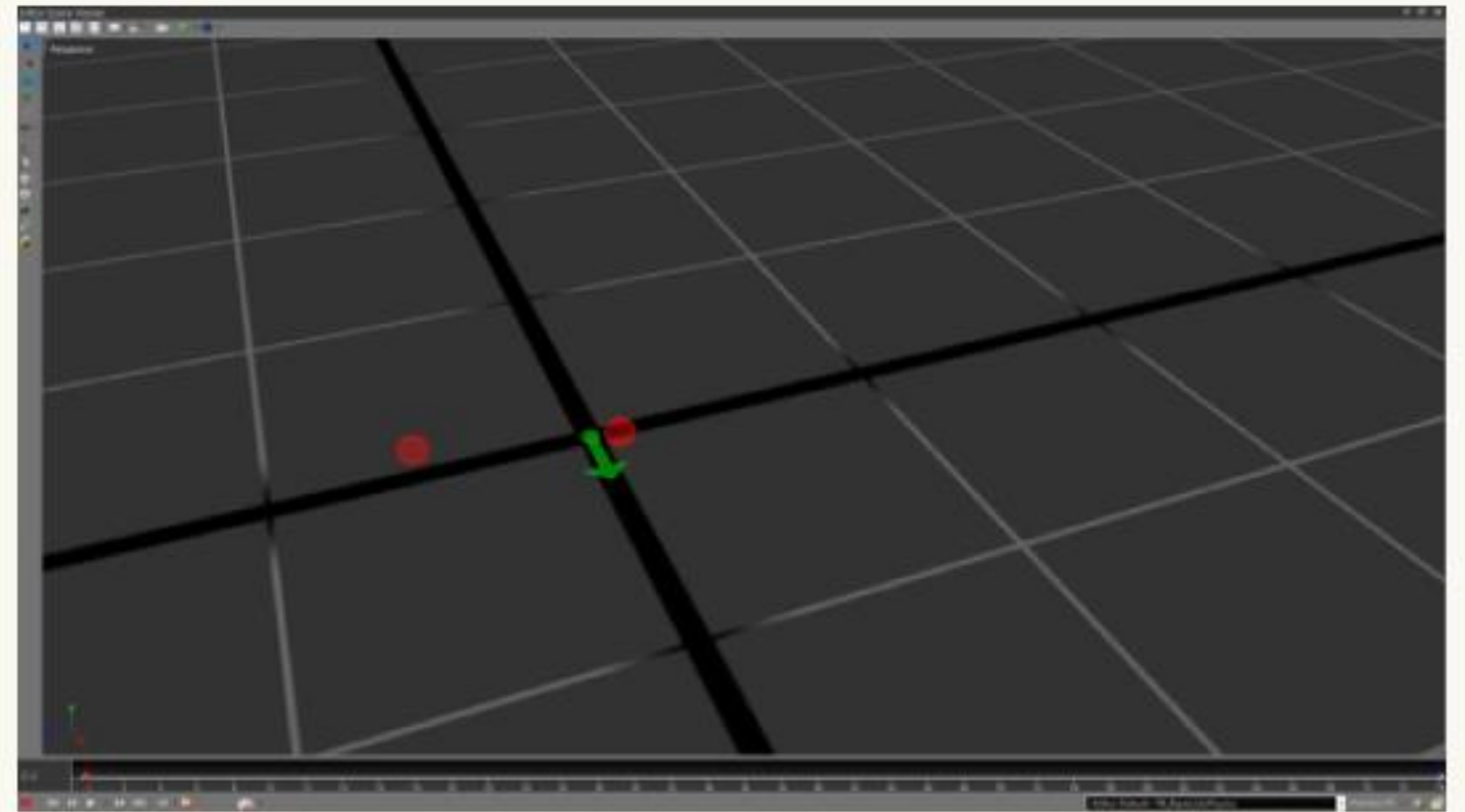
Y

Pop Quiz +

Start animation or acceleration from turn?



X

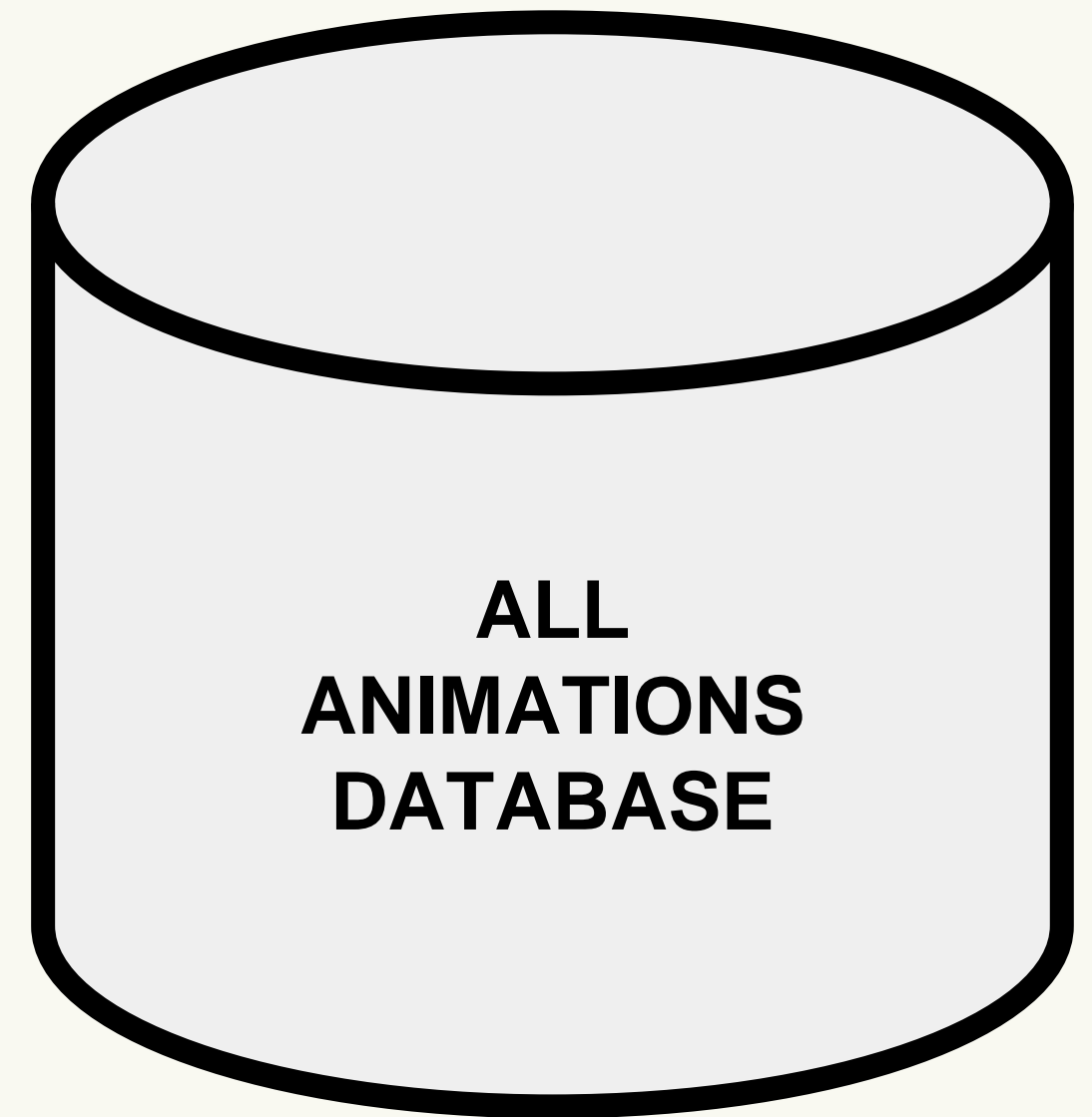


Y

Organizing Your Data

Solutions

- **Very carefully authoring animations so they will exactly match requests in game.**
- Reducing the amount of selectable frames.



Organizing Your Data

Solutions

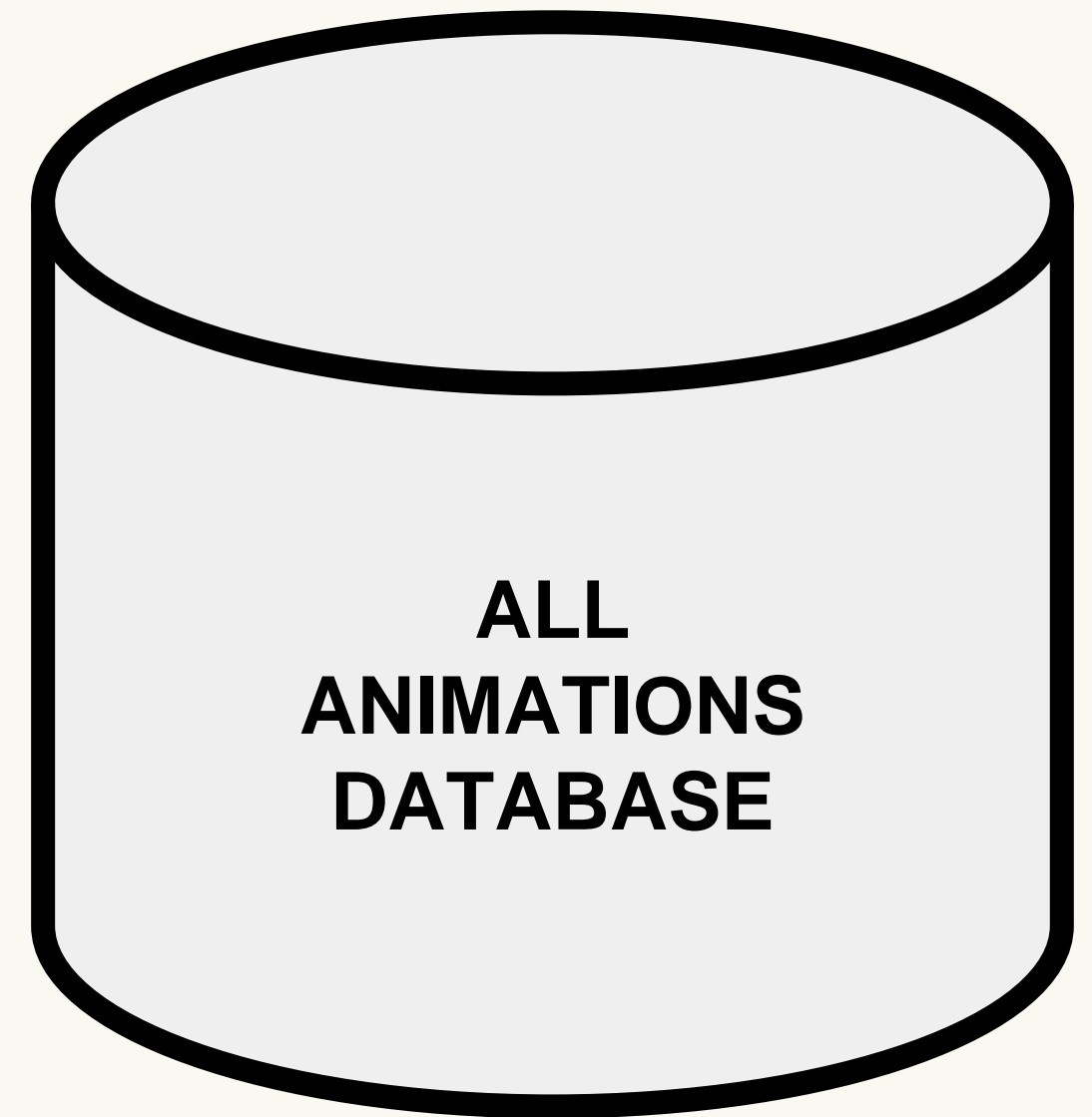
- **Very carefully authoring animations so they will exactly match requests in game.**



Organizing Your Data

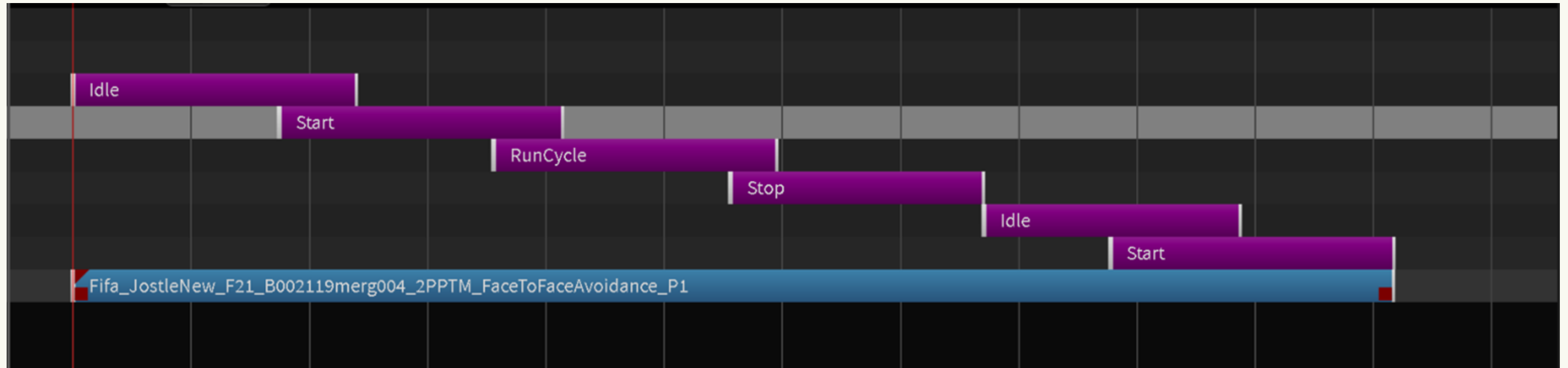
Solutions

- Very carefully authoring animations so they will exactly match requests in game.
- **Reducing the amount of selectable frames.**



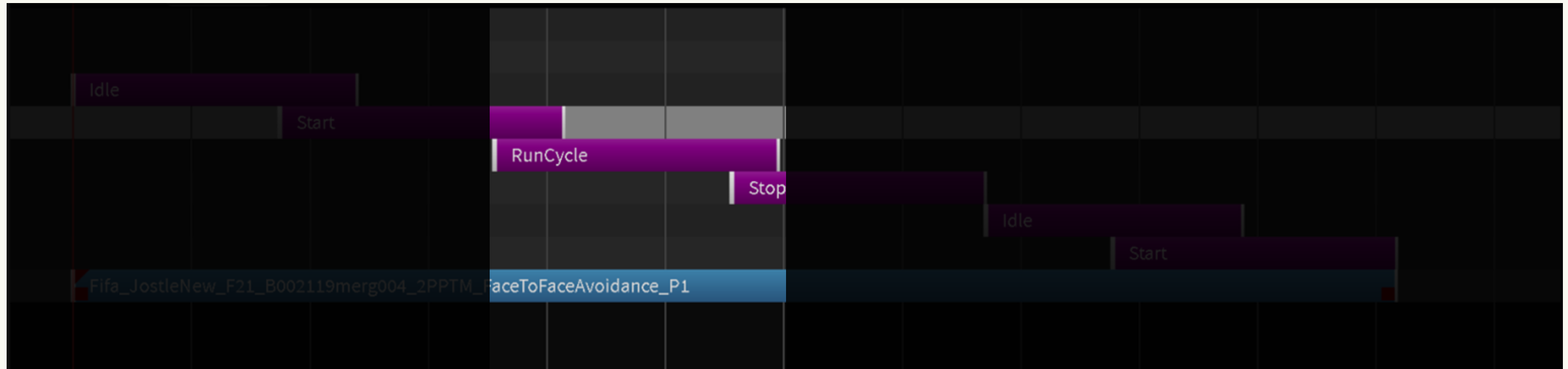
Asset Tags

Usual motion types: starts, stops, run cycles, drastic turns, idles, etc.

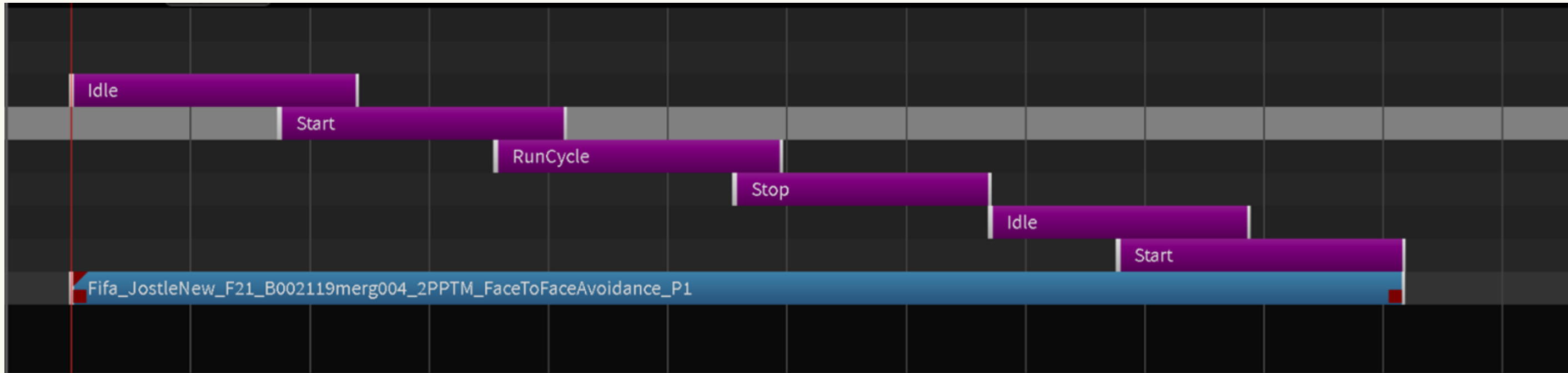


Asset Tags: Filtering

Usual motion types: starts, stops, run cycles, drastic turns, idles, etc.



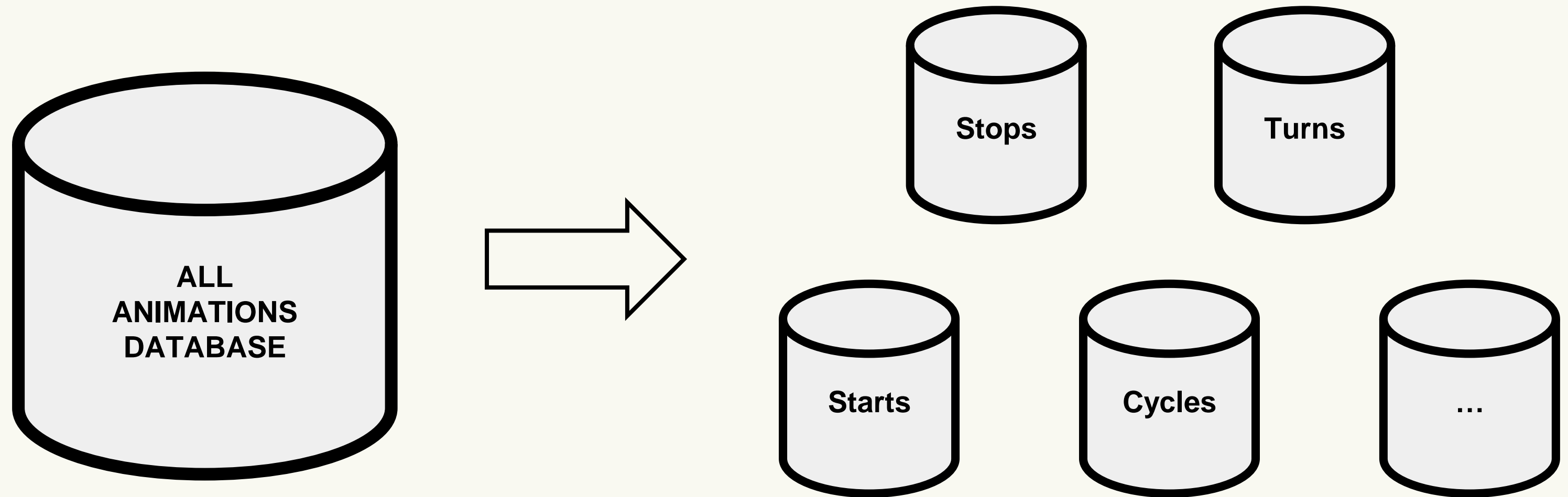
Asset Tags



- Tagging is time consuming and error prone.
- Constantly opening assets to view tags.

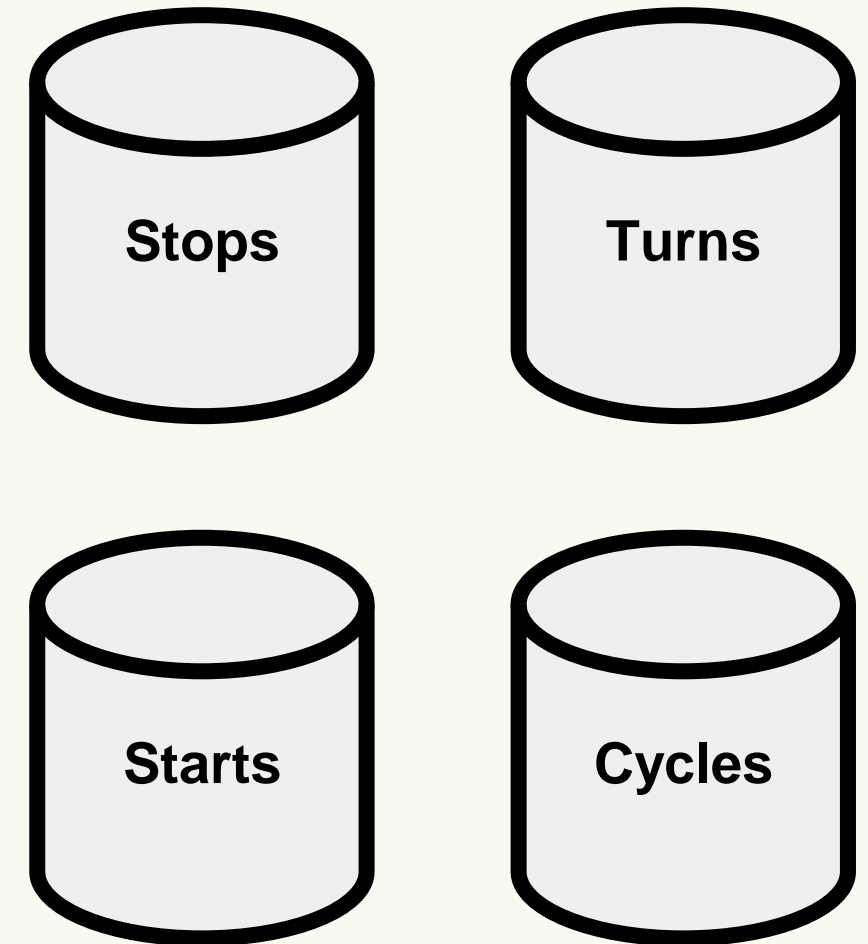
Bucketing

- Database broken up into the same categories: starts, stops, cycles, drastic turns, facing changes.



Bucketing

- Searching only from data that is appropriate for the situation
- Becomes very easy to see all assets of one type.
- Easier to vary the MM parameters and feature weights per database.
- Faster to drop an asset into a database than it is to open it up and add the appropriate tag



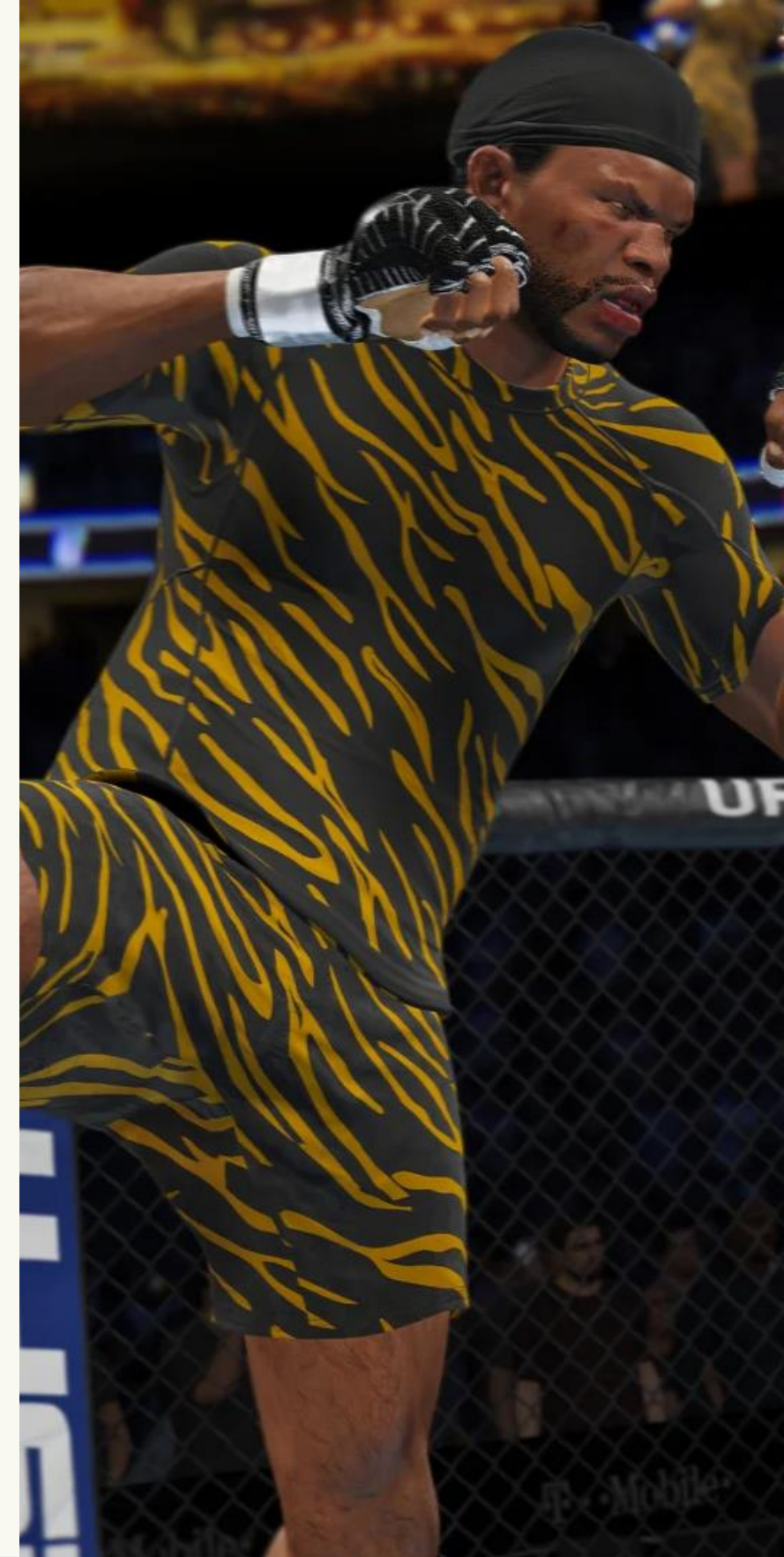
Asset Tags & Bucketing

- Both systems can co-exist.
- Can choose to use one or the other, or combine them.
- Give your team options. Allow them to work however they feel most comfortable



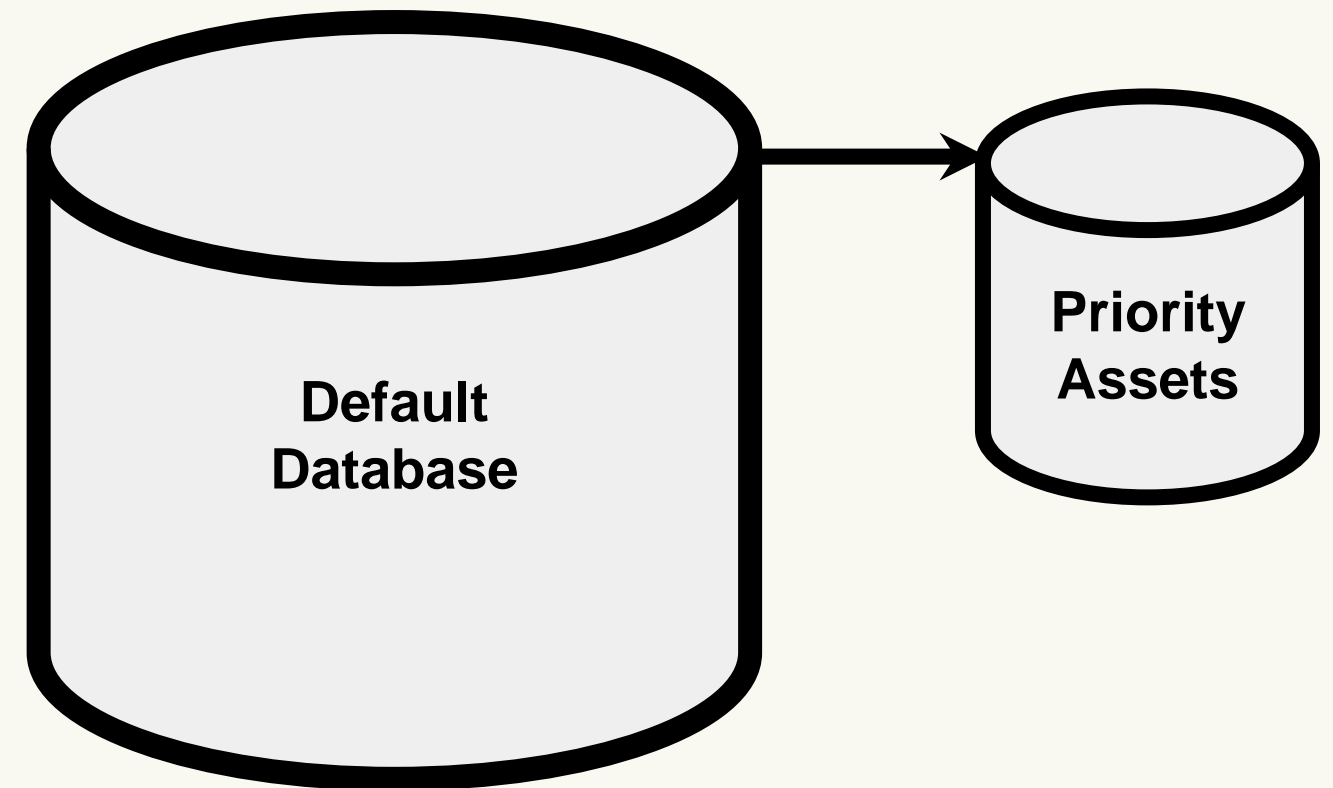
Context Specific Data

- Prioritize certain animation over others.
- Want a different run forward animation without creating a full locomotion set.
- How do we solve this?



Priority Databases

- Separate database of **prioritized** assets.
- Referenced by the default database.
- If the cost of the best asset in the priority database is below a threshold, then take that asset.
- If not, query the default database. Select between the lowest cost of the two frames.



Priority Databases

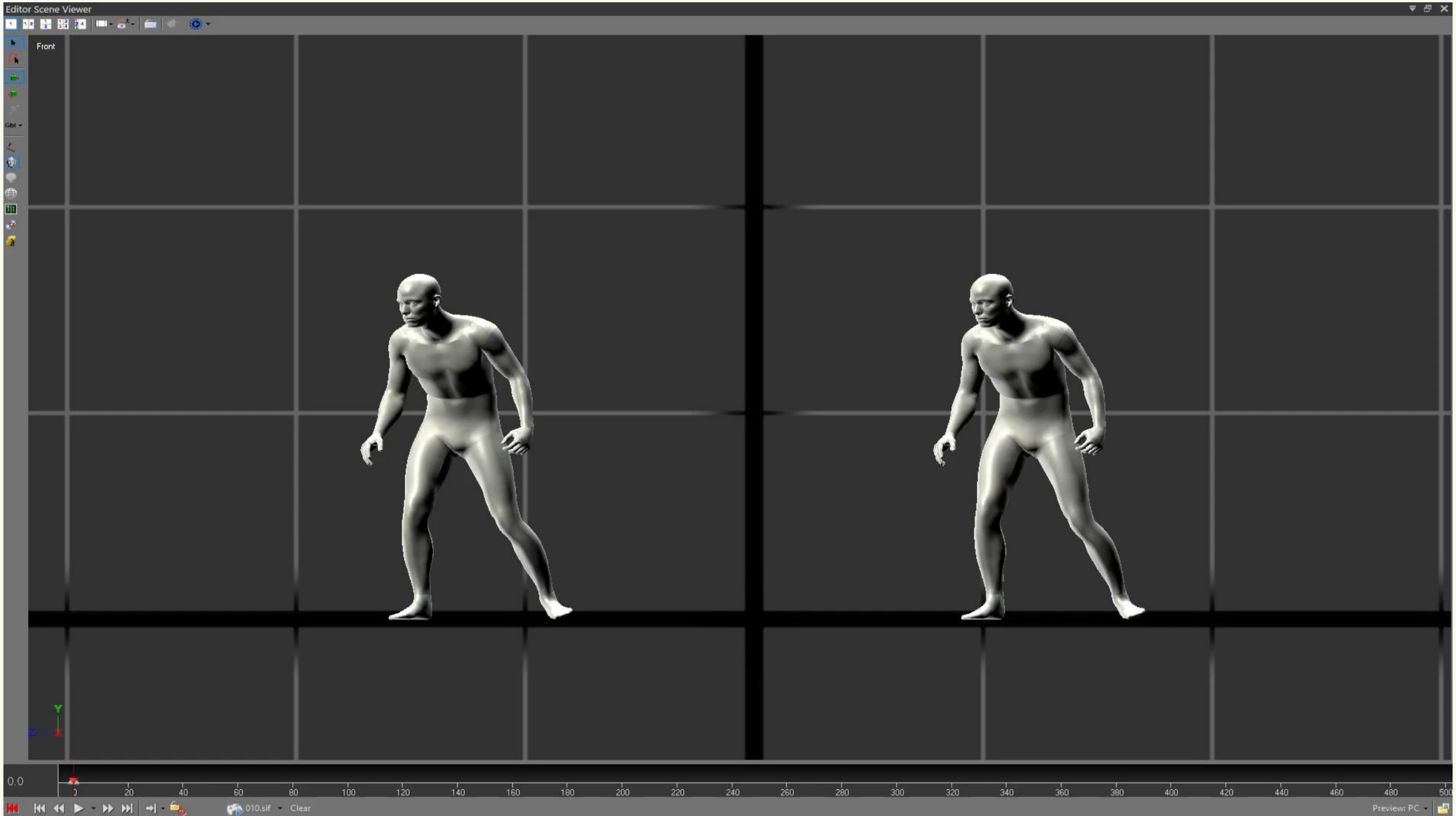
Disabled

Enabled



Disabled

Enabled

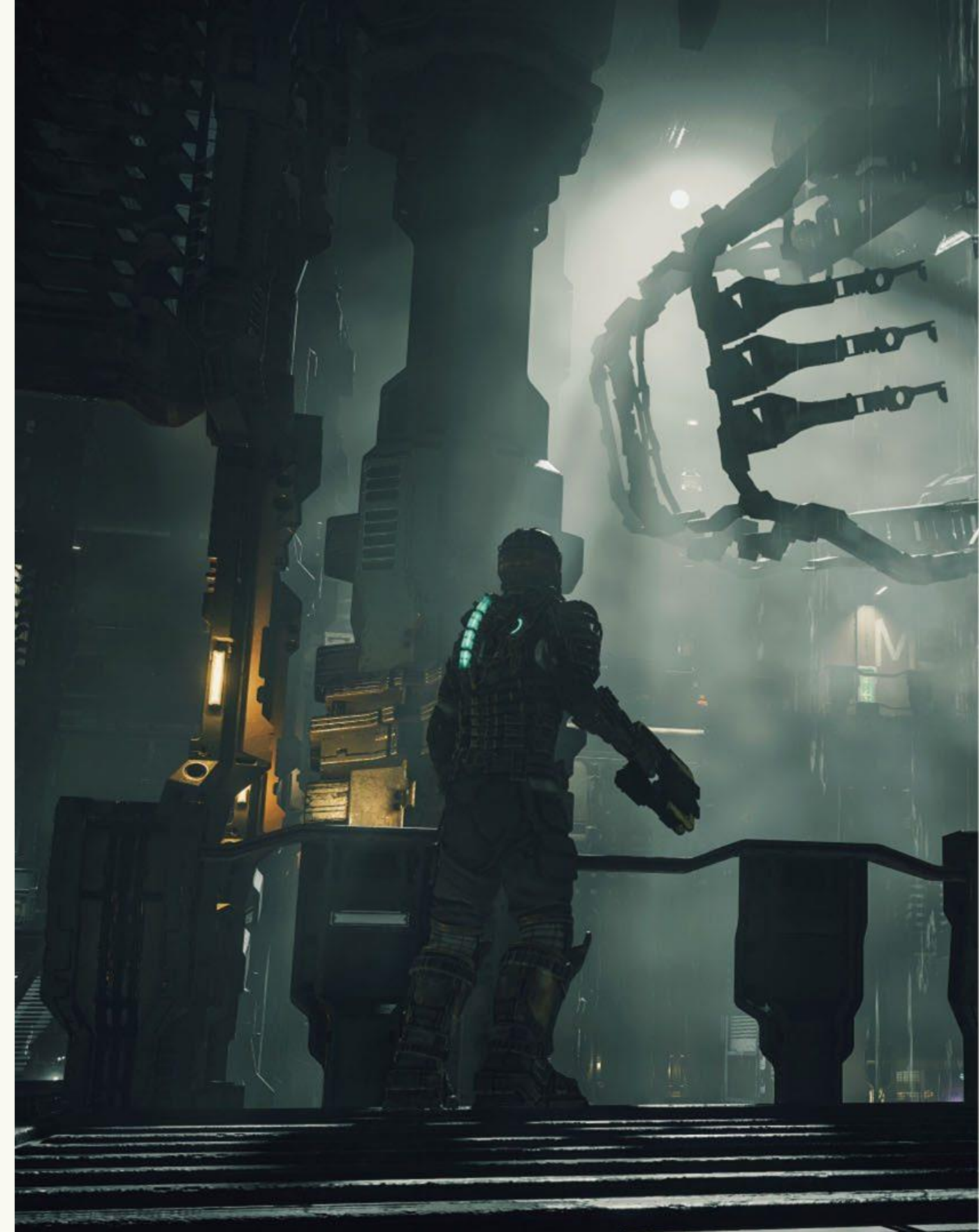


Pros

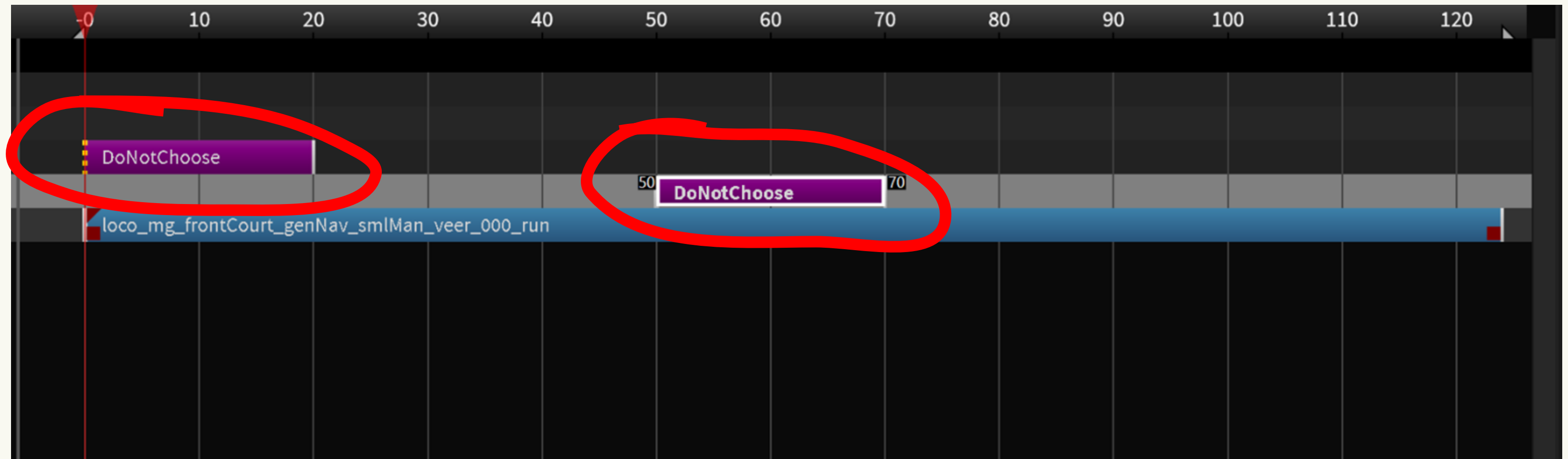
- Prioritized assets don't need to compete with default assets.
- Don't need extra tags on assets.
- The priority database can be loaded dynamically and only used if available.



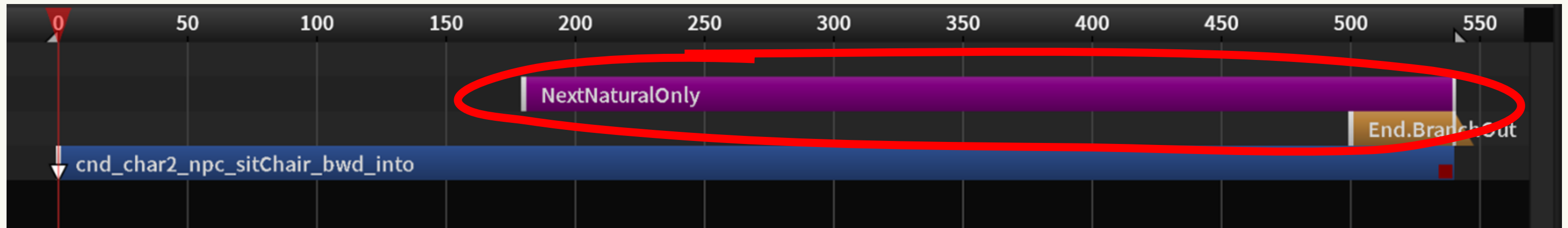
3. Tips, Tricks and Timesavers



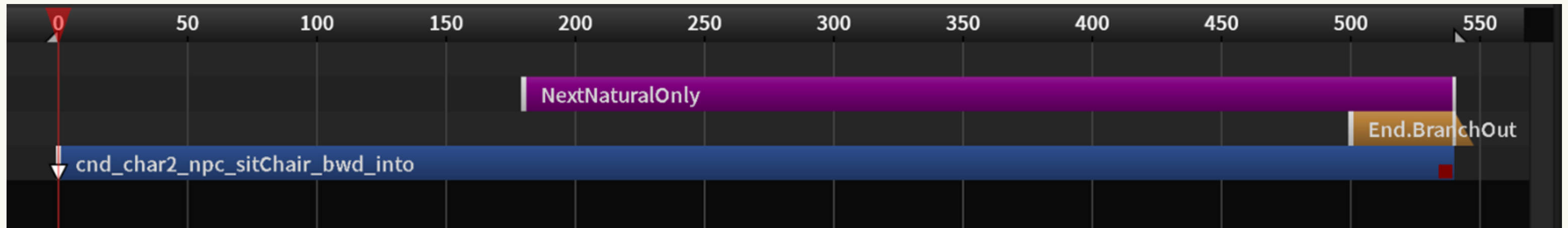
Tags: DoNotChoose



Tag: NextNaturalOnly



Tag: NextNaturalOnly



Can enter in
this zone

Tag: NextNaturalOnly

- Don't skip over important segments of the animation.



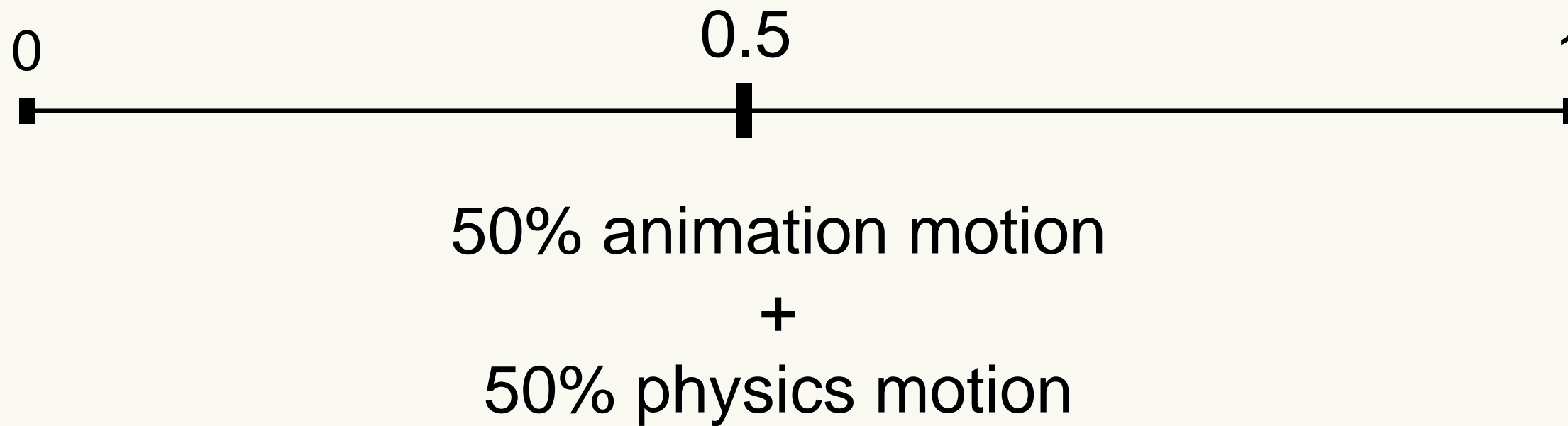
Root Motion Weight



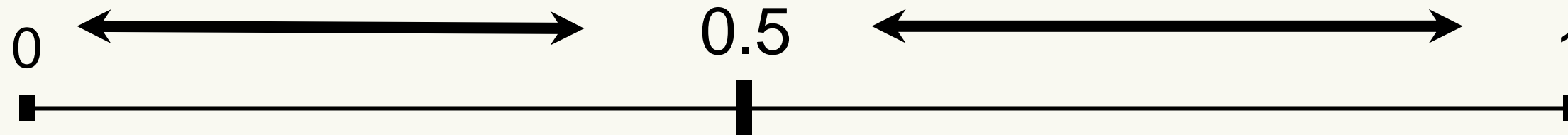
- driven by physics or motion model
- **consistent motion feel**
- **lower fidelity**

- root motion
- driven by animation
- **can feel inconsistent**
- **higher fidelity**

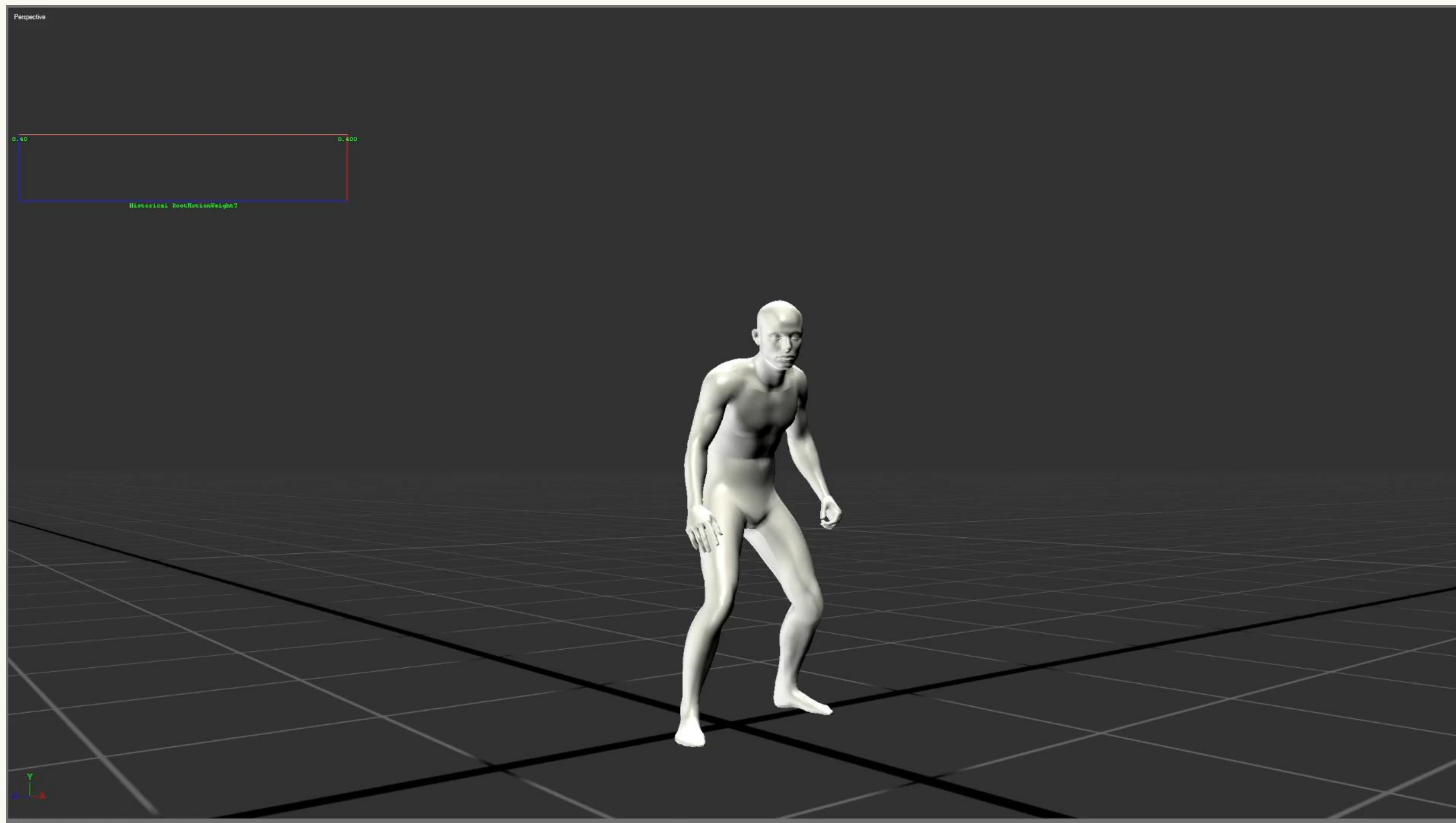
Root Motion Weight



Root Motion Weight



Can change values at runtime



Zero Root Motion

Variable Root Motion



Debugging



ProgrammerHumor.io

Diagnostics

Editor Scene Viewer × Stateflow Display ×

Perspective

208.0

0 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600

<Project Default> Actor_FB_Biped_Physics

Preview: PC

Asset Properties: PTM Locomotion Controller - FIFA.PTM.Strafe.PTMLoco × GameState Watch 1 × Debug Info 1 × Editor Docks ×

BipedProject × FIFA.PTM.Strafe.PTMLoco ×

Motion Database

PTMDBase FIFA.StrafeLoco.PTMDB.CDB

Context... Asset

PriorityC... 2.75

PriorityD... Asset

PriorityE... Asset

Movement Parameters

Root Motio... PTM.RootMotionT.Float

ClipMov... 10

ClipTraje... 16

MaxPath... -1

PathDist... 0

Matching

ExcludePos... 6

RandomVa... Asset

Ticks Befor... 2

Facing Parameters

PTM Diagnostics

Control Panel

Animatable Selection Actor_FB_Biped_Physics 1 Result 0

Debug Category PTM Draw Pose Animate Poses

Diagnostics Updated at Tick: 208.00 Stats Details Copy Stats

PTM Status

clip: 'Fifa_loco_ptm_strafe_circle_jog_02': 412.85 (+2.12) min: 0 dt: 2.00
database: 'Fifa.Loco.StrafeJog.PTMDB.Default' compressed: 0 evaluated: 40
Path: 'Fifa.Jostle.Friction.Path'
cost: 36.82 pose: 7.54 traj: 29.27 other: 0.00
ticksSinceSearch: 2.00 rootWeight: 0.25 horizon: 40.0 pastHorizon: 40.0
inspeed: 1.37m/s desired speed: 1.37m/s clip speed: 1.41m/s
outspeed: 1.38m/s outaccel: 0.768m/s^2 future accel: 0.000m/s^2
speed diff: -0.00m/s move angle diff: -3.7deg face diff: 0.0deg face angle level: 0.0deg/sec
motion type: Constant Cycle is stopped: 0

PTM Searches

Order	Clip Name	DB Name	Ticks	Fi
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.85	2
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	414.00	2

Top Candidates

Name Filter Search is off

Show Cost Details All Cost Summary PoseFeatures PoseFeaturesBreak Trajectory Bias Events

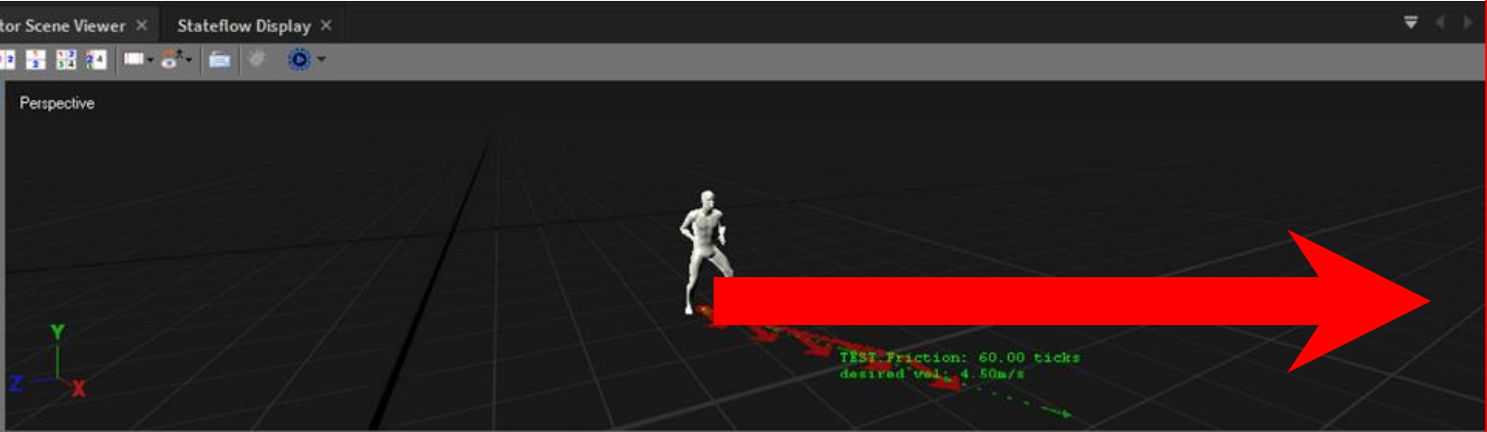
Clip Name	DB Name	Ticks	Frame	Mirrored
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.85	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	414.00	207	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.00	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	376.00	188	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	378.00	189	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	448.00	224	False
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Default	844.00	422	True
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Default	846.00	423	True
Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Default	50.00	25	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	416.00	208	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	380.00	190	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	448.00	223	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	416.00	206	False

Asset Explorer (Main) Debug Lines Editor Debug Info Details PTM Diagnostics

Diagnostics

Editor Scene Viewer × Stateflow Display ×

Perspective



208.0

0 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570

<Project Default> Actor_FB_Biped_Physics Preview: PC

Asset Properties: PTM Locomotion Controller - FIFA.PTM.Strafe.PTMLoco × GameState Watch 1 × Debug Info 1 × Editor Docks ×

BipedProject × FIFA.PTM.Strafe.PTMLoco ×

Motion Database

PTMDatabase FIFA.StrafeLoco.PTMDB.CDB

Context... Asset

PriorityC... 2.75

PriorityD... Asset

PriorityE... Asset

Movement Parameters

Root Motio... PTM.RootMotionT.Float

ClipMov... 10

ClipTraje... 16

MaxPath... -1

PathDist... 0

Matching

ExcludePos... 6

RandomVa... Asset

Ticks Befor... 2

Facing Parameters

PTM Diagnostics

Control Panel

Animatable Selection Actor_FB_Biped_Physics 1 Result 0

Debug Category PTM Draw Pose Animate Poses

Diagnostics Updated at Tick: 208.00 Stats Details Copy Stats

PTM Status

clip: 'Fifa_loco_ptm_strafe_circle_jog_02': 412.85 (+2.12) min: 0 dt: 2.00
database: 'Fifa.Loco.StrafeJog.PTMDB.Default' compressed: 0 evaluated: 40
Path: 'Fifa.Jostle.Friction.Path'
cost: 36.82 pose: 7.54 traj: 29.27 other: 0.00
ticksSinceSearch: 2.00 rootWeight: 0.25 horizon: 40.0 pastHorizon: 40.0
inspeed: 1.37m/s desiredSpeed: 1.37m/s clipSpeed: 1.41m/s
outspeed: 1.38m/s outAccel: 0.768m/s^2 futureAccel: 0.000m/s^2
speedDiff: -0.00m/s moveAngleDiff: -3.7deg faceDiff: 0.0deg faceAngleLevel: 0.0deg/sec
motion type: ConstantCycle is stopped: 0

PTM Searches

Order	Clip Name	DB Name	Ticks	F
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.85	2
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	414.00	2

Top Candidates

Name Filter Search is off

Show Cost Details All Cost Summary PoseFeatures PoseFeaturesBreak Trajectory Bias Events

Clip Name	DB Name	Ticks	Frame	Mirrored
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.85	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	414.00	207	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	412.00	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	376.00	188	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	378.00	189	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	448.00	224	False
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Default	844.00	422	True
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Default	846.00	423	True
Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Default	50.00	25	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	416.00	208	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	380.00	190	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	448.00	223	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Default	416.00	206	False

Asset Explorer (Main) Debug Lines Editor Debug Info Details PTM Diagnostics

Diagnostics

PTM Status

```
clip:'Fifa_loco_ptm_strafe_circle_jog_02':412.85 (+2.12) mir:0 dt:2.00
database:'Fifa.Loco.StrafeJog.PTMDB.Default' compressed:0 evaluated:40
Path: 'Fifa.Jostle.Friction.Path'
cost:36.82 pose:7.54 traj:29.27 other:0.00
ticksSinceSearch:2.00 rootWeightT:0.25 horizon:40.0 pastHorizon:40.0
inspeed:1.37m/s desiredspeed:1.37m/s clipspeed:1.41m/s
outspeed:1.38m/s outaccel:0.768m/s^2 futureaccel:0.000m/s^2
speeddiff:-0.00m/s moveanglediff:-3.7deg facediff:0.0deg faceanglelevel:0.0deg/sec
motion type:ConstantCycle is stopped:0
clip motionType:[Default] clip looping:0
want stop:0 ==> avgFutureVel(0.08) >= stopSpeedThreshold(0.02)
want idle:0 ==> motionType.WantStop == false
want turnOnSpot:0 ==> BelowTurnOnSpotSpeed:0 && wantStop:0 && (isNotFacingCorrect:0 || isTurningFast:0)
want cycle:1 ==> isCycling(1) & !motionType.IsStopped(0)
want start:0 ==> wantStartFromStop(0) : velocity(0.08) >= startSpeedThreshold(0.03) wantStartFromIdle(0) : recentlyStopped(0) | rollingStart(0)
want drastic turn:0 ==> velDiffAngle(3.70) <= minDrasticTurnAngle(100.00)
phase tol:0.5 footsweep:0
lastFilter: incl:ffffffff[All Flags Set], excl:000a[DoNotChoose|NextNaturalOnly], and:0, clip:-1, KDFound:1
Pose Scale:1.00 Trajectory Scale:1.00 Path Scale:1.00
TrajAdjust: speedmult:1.18 (timescale:1.06 footwarp:1.11) angleadj:17.55
DeltaTrajOut: trans:(x:0.128 y:0.000 z:-0.080) mag:0.151
RootMotionWeightQ:0.00, Rot: path:0.00deg anim:0.17deg adjust:-0.17deg out:0.00deg
footwarp:1 motionwarp:0.00
```

PTM Diagnostics

Control Panel

Animatable SelectionActor_FB_Biped_Physics1 Result0

Debug CategoryPTMDraw PoseAnimate Poses

PTM Status

clip:'Fifa_loco_ptm_strafe_circle_jog_02':412.85 (+2.12) mir:0 dt:2.00
database:'Fifa.Loco.StrafeJog.PTMDB.Default' compressed:0 evaluated:40
Path: 'Fifa.Jostle.Friction.Path'
cost:36.82 pose:7.54 traj:29.27 other:0.00
ticksSinceSearch:2.00 rootWeightT:0.25 horizon:40.0 pastHorizon:40.0
inspeed:1.37m/s desiredspeed:1.37m/s clipspeed:1.41m/s
outspeed:1.38m/s outaccel:0.768m/s^2 futureaccel:0.000m/s^2
speeddiff:-0.00m/s moveanglediff:-3.7deg facediff:0.0deg faceanglelevel:0.0deg/sec
motion type:ConstantCycle is stopped:0

PTM Searches

Order	Clip Name	DB Name	Ticks	Fi
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85	2
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00	2

Top Candidates

Name FilterSearch is off

Show Cost DetailsAllCost SummaryPoseFeaturesPoseFeaturesBreakTrajectoryBiasEvents

Clip Name	DB Name	Ticks	Frame	Mirrored
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00	207	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.00	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	376.00	188	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	378.00	189	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	448.00	224	False
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	844.00	422	True
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	846.00	423	True
Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defau	50.00	25	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	416.00	208	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	380.00	190	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	446.00	223	False

Diagnostics

PTM Searches								
Order	Clip Name	DB Name	Ticks	Frame	Mirrored	Filtered	Thre...	Cost
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85	206	False		-1.00	36.82
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00	207	False		-1.00	42.19

PTM Diagnostics

Control Panel

Animatable Selection

Actor_FB_Biped_Physics

1 Result

0

Debug Category

PTM

Draw Pose

Animate Poses

Diagnostics Updated at Tick: 208.00

Stats Details

Copy Stats

PTM Status

clip:'Fifa_loco_ptm_strafe_circle_jog_02':412.85 (+2.12) min:0 dt:2.00
database:'Fifa.Loco.StrafeJog.PTMDB.Default' compressed:0 evaluated:40
Path: 'Fifa.Jostle.Friction.Path'
cost:36.82 pose:7.54 traj:29.27 other:0.00
ticksSinceSearch:2.00 rootWeightT:0.25 horizon:40.0 pastHorizon:40.0
inspeed:1.37m/s desiredspeed:1.37m/s clipspeed:1.41m/s
outspeed:1.38m/s outaccel:0.768m/s^2 futureaccel:0.000m/s^2
speeddiff:-0.00m/s moveanglediff:-3.7deg facediff:0.0deg faceanglelevel:0.0deg/sec
motion type:ConstantCycle is stopped:0

PTM Searches

Order	Clip Name	DB Name	Ticks
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00

Top Candidates

Name Filter

Search is off

Show Cost Details

All

Cost Summary

PoseFeatures

PoseFeaturesBreak

Trajectory

Bias

Events

Clip Name	DB Name	Ticks	Frame	Mirrored
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00	207	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.00	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	376.00	188	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	378.00	189	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	448.00	224	False
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	844.00	422	True
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	846.00	423	True
Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defau	50.00	25	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	416.00	208	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	380.00	190	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	446.00	223	False

Diagnostics

Top Candidates

Name Filter

Search is off

Show Cost Details

All

Cost Summary

PoseFeatures

PoseFeaturesBreak

Trajectory

Bias

Events

Rank	Clip Name	DB Name	Ticks	Frame	Mirrored	Filtered	Cost
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	412.85	206	False		36.82
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	414.00	207	False		42.19
2	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	412.00	206	False	Phase	45.33
3	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	376.00	188	False	Phase	57.54
4	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	378.00	189	False		58.50
5	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	448.00	224	False	Phase	65.20
6	Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defal	844.00	422	True	Phase	72.90
7	Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defal	846.00	423	True		77.06
8	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	50.00	25	False		79.67
9	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	416.00	208	False		81.11
10	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	380.00	190	False		83.42
11	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	446.00	223	False	Phase	86.59
12	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	450.00	225	False		88.81
13	Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defal	848.00	424	True		101.96
14	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	374.00	187	False	Phase	115.52
15	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	418.00	209	False		123.41
16	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	52.00	26	False		124.00
17	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	382.00	191	False		149.89
18	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	1,578.00	789	False	Phase	153.41
19	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	48.00	24	False	Phase	156.52
20	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	1,580.00	790	False		163.18
21	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	268.00	134	True		171.26
22	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	54.00	27	False		185.15
23	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	1,582.00	791	False		194.20
24	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	270.00	135	True		214.20
25	Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defal	266.00	133	True	Phase	219.70
26	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	384.00	192	False		269.91

PTM Diagnostics

Control Panel

Animatable Selection

Actor_FB_Biped_Physics

1 Result

0

Debug Category

PTM

Draw Pose

Animate Poses

Diagnostics Updated at Tick: 208.00

Stats Details

Copy Stats

PTM Status

clip:'Fifa_loco_ptm_strafe_circle_jog_02':412.85 (+2.12) min:0 dt:2.00
database:'Fifa.Loco.StrafeJog.PTMDB.Default' compressed:0 evaluated:40
Path: 'Fifa.Jostle.Friction.Path'
cost:36.82 pose:7.54 traj:29.27 other:0.00
ticksSinceSearch:2.00 rootWeightT:0.25 horizon:40.0 pastHorizon:40.0
inspeed:1.37m/s desiredspeed:1.37m/s clipspeed:1.41m/s
outspeed:1.38m/s outaccel:0.768m/s^2 futureaccel:0.000m/s^2
speeddiff:-0.00m/s moveanglediff:-3.7deg facediff:0.0deg faceanglelevel:0.0deg/sec
motion type:ConstantCycle is stopped:0

PTM Searches

Order	Clip Name	DB Name	Ticks	Fi
0 nn	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	412.85	2
1	Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defal	414.00	2

Top Candidates

Name Filter

Search is off

Show Cost Details

All

Cost Summary

PoseFeatures

PoseFeaturesBreak

Trajectory

Bias

Events

Clip Name	DB Name	Ticks	Frame	Mirrored
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.85	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	414.00	207	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	412.00	206	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	376.00	188	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	378.00	189	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	448.00	224	False
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	844.00	422	True
Fifa_loco_ptm_strafe_spiral_cw_jog_0	Fifa.Loco.StrafeJog.PTMDB.Defau	846.00	423	True
Fifa_loco_ptm_strafe_slalom_fwdback	Fifa.Loco.StrafeJog.PTMDB.Defau	50.00	25	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	416.00	208	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	380.00	190	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	446.00	223	False
Fifa_loco_ptm_strafe_circle_jog_02	Fifa.Loco.StrafeJog.PTMDB.Defau	450.00	225	False

Debug Visualization

Candidate pose + trajectory

The screenshot displays a game engine interface with several panels. The main 3D scene view shows a character model in a perspective view, with a red trajectory line and a red pose marker. A red arrow points from the 'Top Candidates' table to the scene view. The 'PTM Diagnostics' panel on the right contains the following sections:

Control Panel

Animatable Selection: Actor_Fifa
Debug Category: PTM
Diagnostics Updated at Tick: 206.00
Stats Details: Copy Stats

PTM Status

clip: Fifa_loco_ptm_jog_constant:10.47 (+2.13) min:0 dt:2.00
database: Fifa.Loco.Jog.PTMDb.ConstantCycle compressed:0 evaluated:60
Path: 'Fifa.Loco.Jog.Friction.Path'
cost:25.69 pose:0.01 traj:26.68 other:1.00
ticksSinceSearch:2.00 rootWeight:0.00 horizon:40.0 pastHorizon:40.0
inspeed:2.74m/s desiredspeed:2.74m/s clipSpeed:2.20m/s

PTM Searches

Order	Clip Name	DB Name	Ticks	Frame	Mirrored	Filtered
0nn	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	10.47	5	False	
1	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	12.00	6	False	

Top Candidates

Name Filter: [Empty]

Show Cost Details: All Cost Summary PoseFeatures PoseFeaturesBreak Trajectory Bias Events

Rank	Clip Name	DB Name	Ticks	Frame	Mirrored	Filter
9	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	16.00	8	False	
10	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	6.00	3	False	Pha
11	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	38.00	19	True	
12	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	28.00	14	True	Pha
13	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	4.00	2	False	Pha
14	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	18.00	9	False	
15	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	26.00	13	True	Pha
16	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	6.00	3	False	Pha
17	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	2.00	1	False	Pha
18	Fifa_loco_ptm_jog_constant	Fifa.Loco.Jog.PTMDb.ConstantC	42.00	21	True	

Asset Explorer (Main)

Debug Lines Editor Debug Info Details PTM Diagnostics

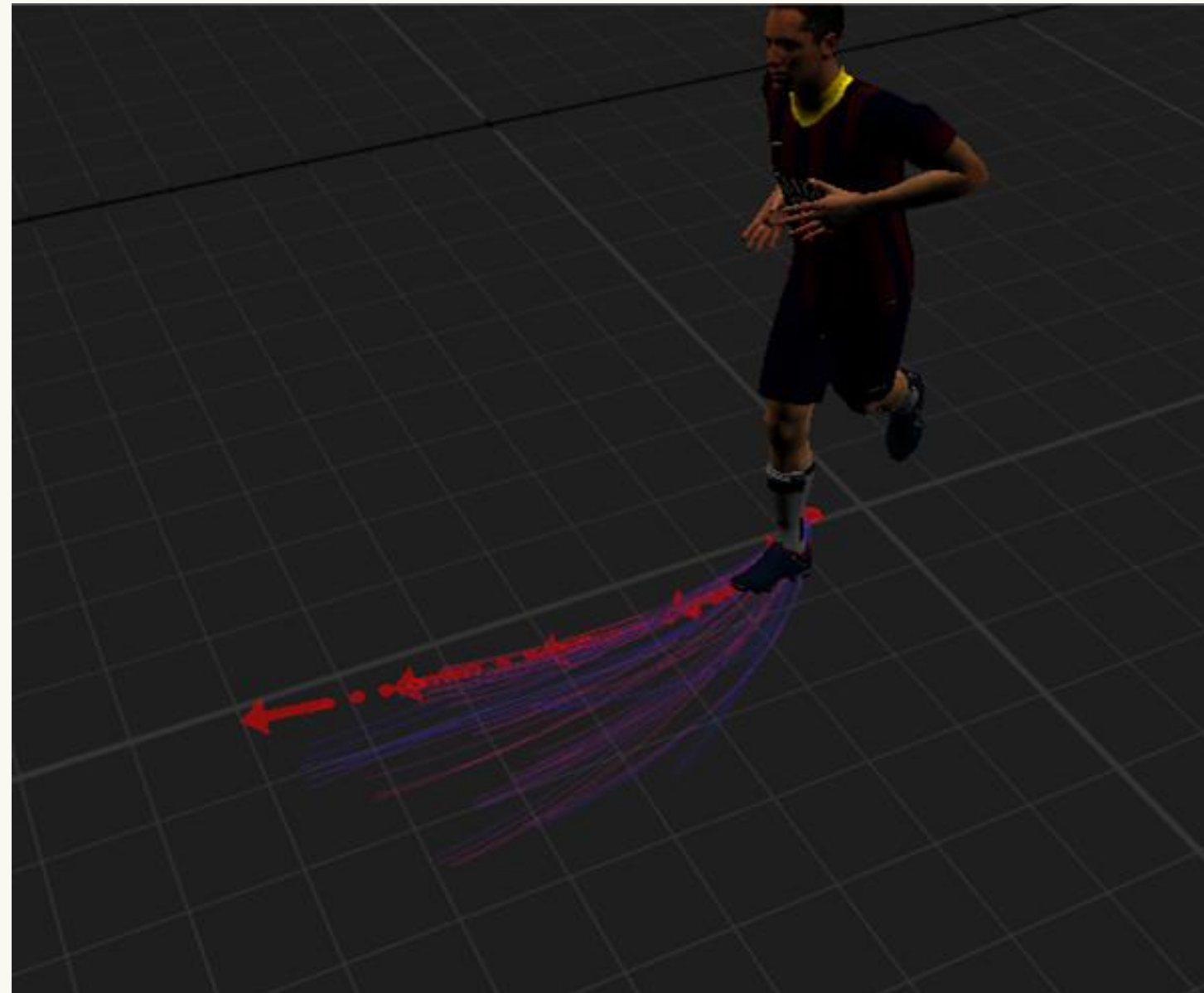
Asset Properties: PTM Locomotion Controller - FIFA.PTM.Loco.PTMLoco

FullPath: ANTProjects/SandboxProject/BipedProject_3/FIFA.PTM.Loco.PTMLoco

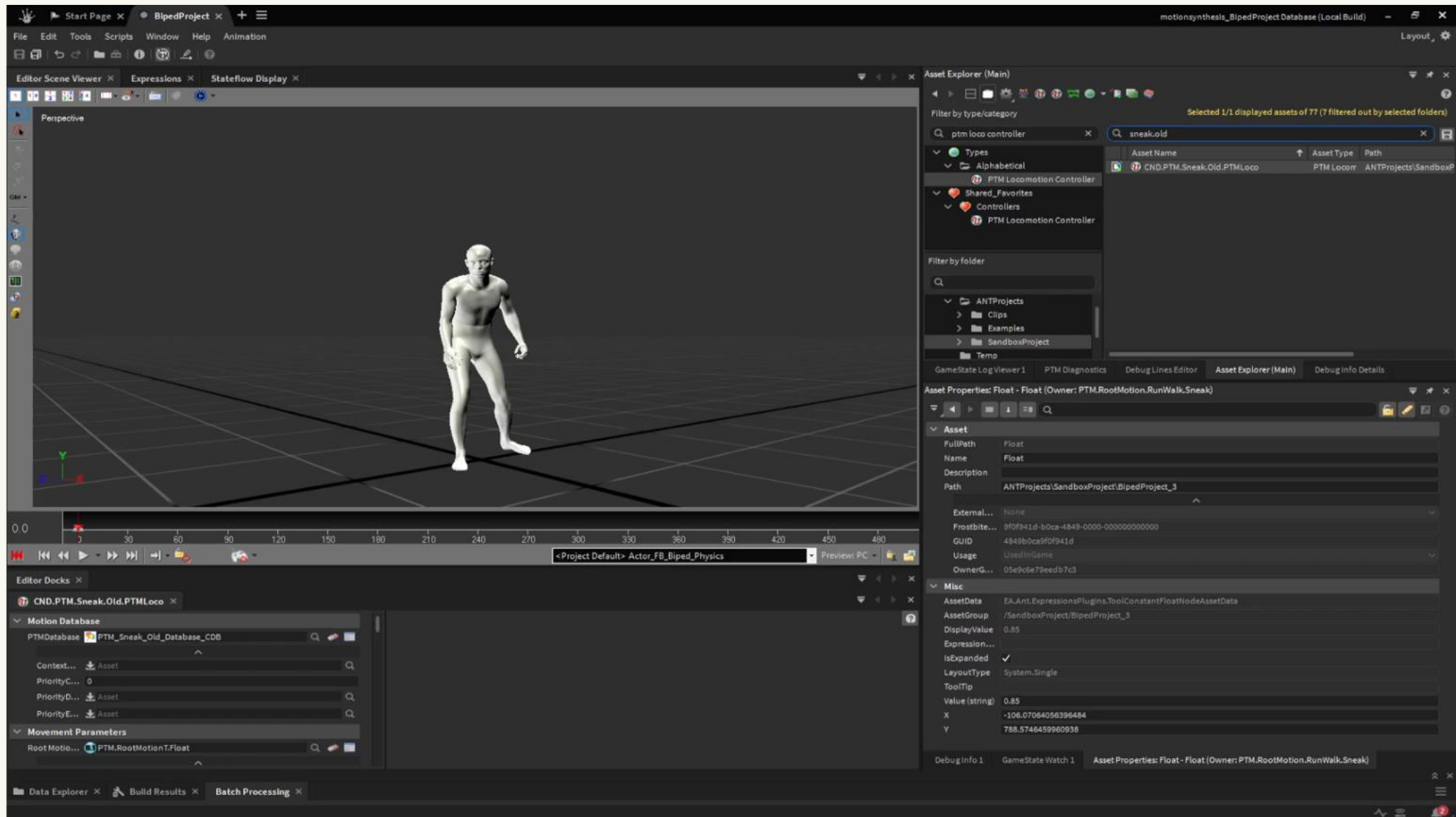
Asset Properties: PTM Locomotion Controller - FIFA.PTM.Loco.PTMLoco GameState Watch 1 Debug Info 1

Debug Visualization

Trajectory of all top candidates



Replay System

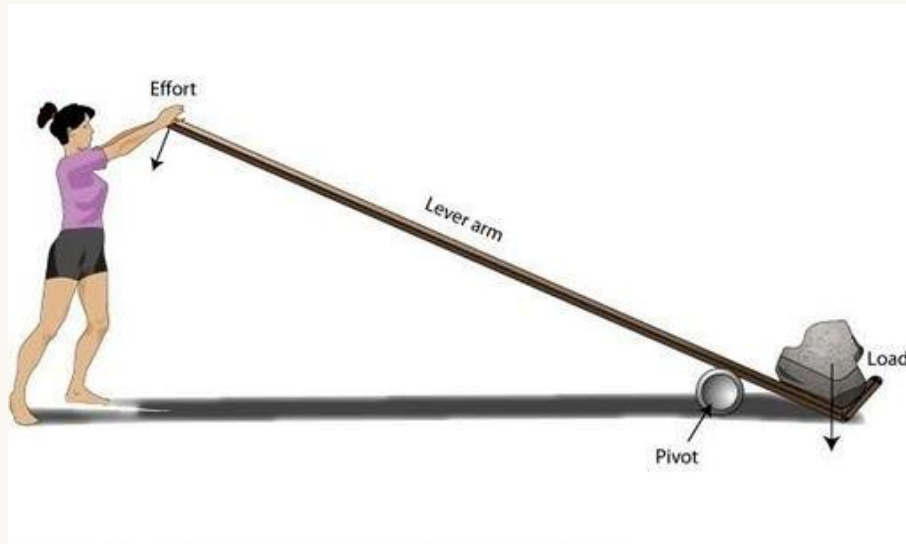




Wrapping Up



Leverage MM outside of locomotion



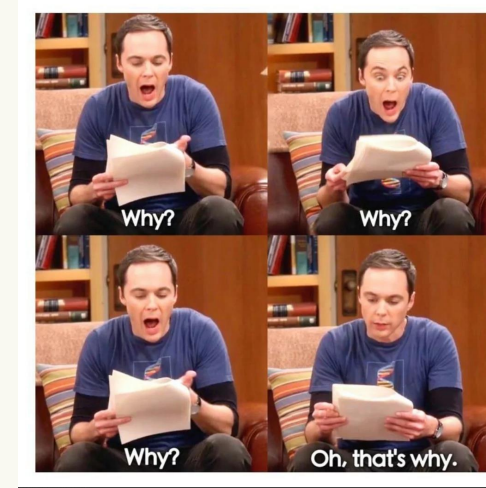
Give options to your teams

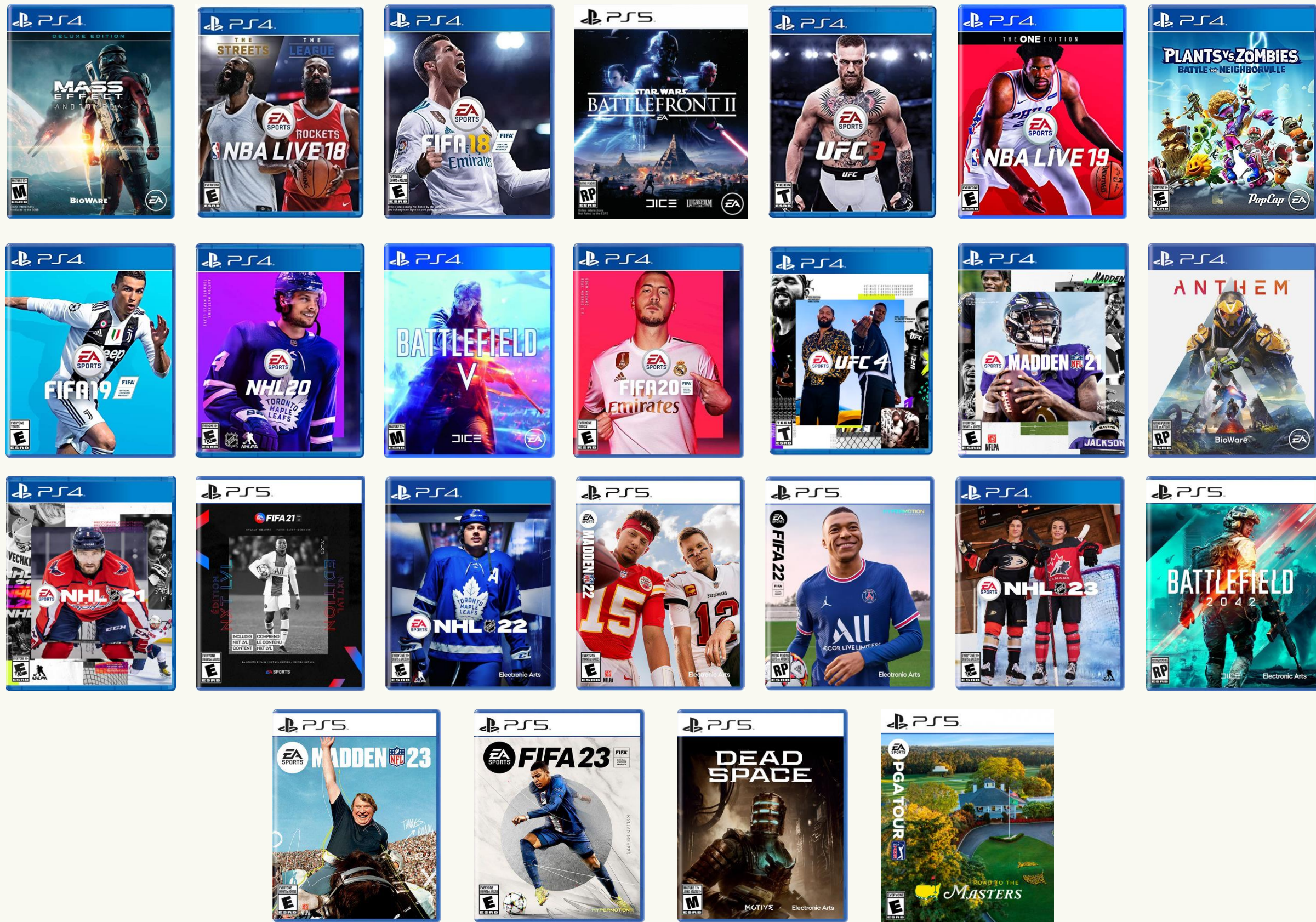


Data organization



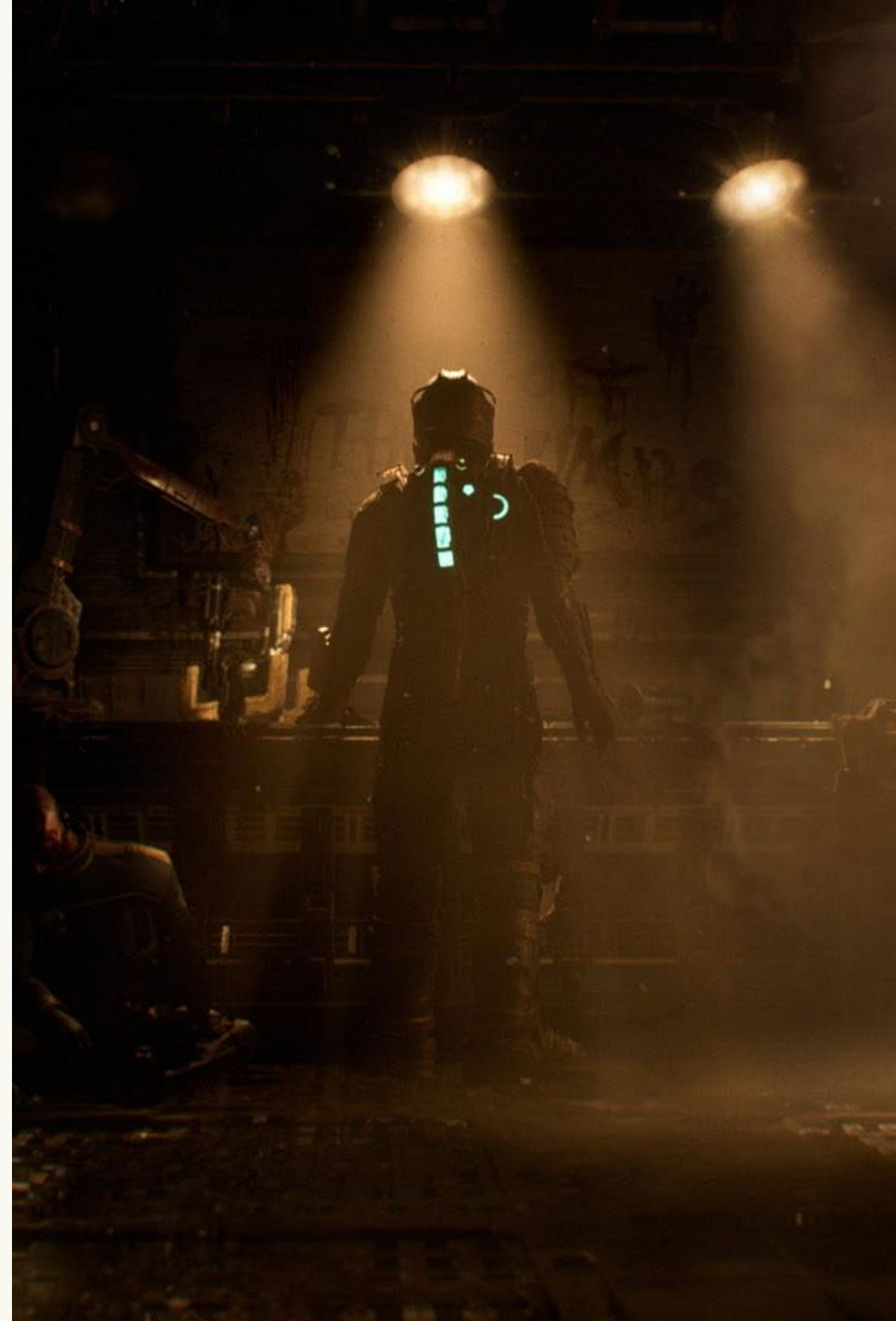
Debugging





Q&A

Thanks for listening!



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the game.
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Electronic Arts

