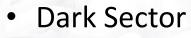
Crafting Al for Epic Boss Battles in Warframe

By Daniel Brewer Lead Al Programmer Digital Extremes

Where am I coming from?





- The Darkness II
- Warframe
- Additionally worked on
- Bioshock 2 MP
- Halo 4 DLC

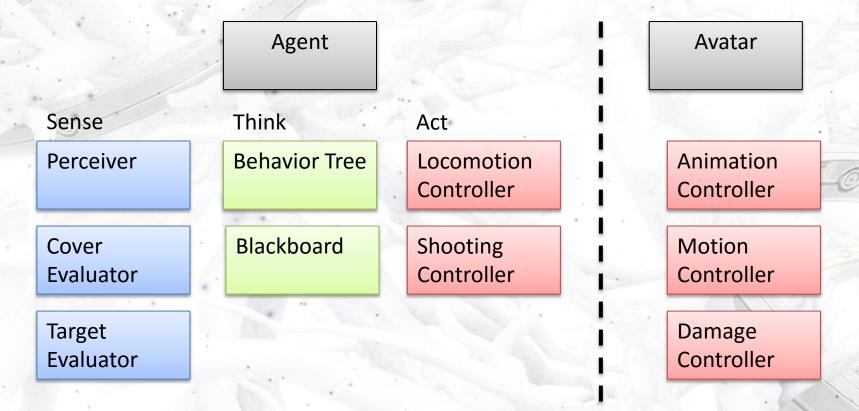


What is a boss fight?

- Epic Spectacle
- Skill Challenge
- Gatekeeper
- Progression Blocker
- Goal
- Reward
- Story Arc Bookend



Modular Framework



Gear and Unique Abilities

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suit:SetActivatingAbilityObjectArg(target.avatar) return 1.0 end

return 0.0

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The Good, The Bad and the Ugly



Mistake: Who's the Boss?

- Scaled up grunt with extra powers
- Tempting for early access, but don't do it
- Sets a precedent that you're stuck with



Tip: Make the Boss Stand Out

- Visually distinct
- Instantly recognizable
- Make him intimidating



If your boss looks huge and intimidating, players will anticipate the satisfaction of defeating him.

Lech Krill

- Intimidating
- Multi Stage Ice and Fire
- Aiming and Agility challenge
- Weak-Spot on Back



Mistake: Obscure Mechanics

- Weak Spot not clear
- No clear cause & effect
- No external play-testing



Tip: Make Mechanics Clear

- Vulnerable weak-spots should be easy to identify
 Clear cause and effect
- Get external play-testers



Make your mechanics easy to discover but challenging to execute.

Captain Vor

- Strong Leader
- Summons reinforcements
- Clear stage breaks
- Escallation with additional special attacks



Mistake: Dull Downtime

- Reinforcements were easy to dispatch
- Players wait too long for end of Invulnerable stages
- Ineffective challenge scaling



Tip: Keep The Players Occupied

- Make waiting around interesting
- Change up the challenge or targets
- No 'dead time'



Always give the players something to do.

Foreshadowing

- A Boss is fight coming up
- This is the boss
- Why is he a target?
- Show his personality
- Potential clues

Foreshadowing

- In-game transmissions
- Messages or Recordings
- Level environment
- Remember Chekhov's gun



Dramatic Pacing





- Introduction
- Crank things up
- Satisfying finale



Mini-Boss vs Boss

Mini-Boss



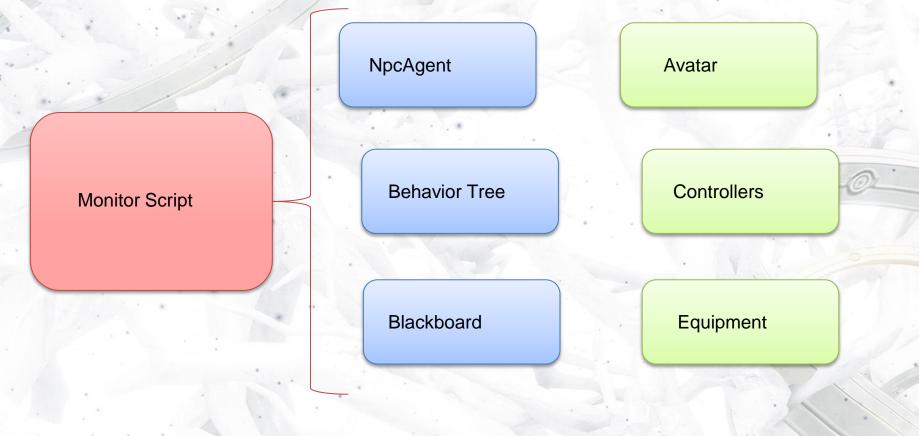
- One trick pony
- No escalation
- Spice up standard gameplay

Boss



- More complex mechanics
- Multiple Escalation Stages
- Stand-alone Encounter

Monitor Script



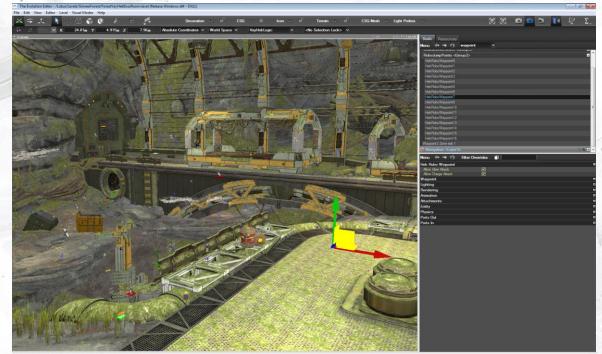
Boss Specific Arena







Hints Direct the Boss



Win: 514 M8 46% X8one: 501 M8 26% PS4: 430 M8 22% IOS: 381 M8 37% Android: 349 M8

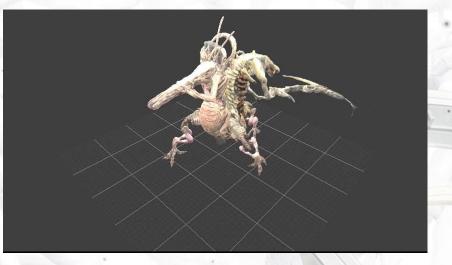
Lephantis

- Gigantic 3 legged monster
 3 heads and attack-forms
 Independently engages targets surrounding it
- Coordinate attacks and animation between heads
- Heads can be destroyed



Locomotion Animation

- Tri-legged gait
- Unnatural and unbalanced
- Needs to convey size and weight



Locomotion Animation



















Locomotion Animation





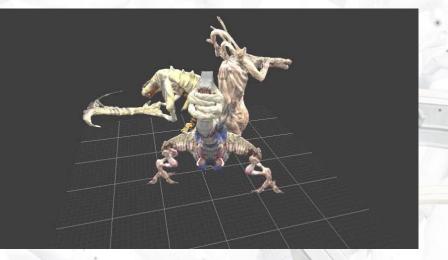


- IK for foot placement important due to size
- 5 joint legs particle IK system

Real-time Motion Retargeting to Highly Varied User-Created Morphologies by Chris Hecker et al

Other animation issues

- Additive Layers
- Each head animates independently
- Additive aim poses for gun head
- Blends on top of full body locomotion
- Full body melee attacks



Other animation issues

- Risk vs Reward
- Exposing weak spots during attacks
- Aiming challenge
- Timing challenge
- Lots of anticipation built into attack animations
- Audio queues for attacks

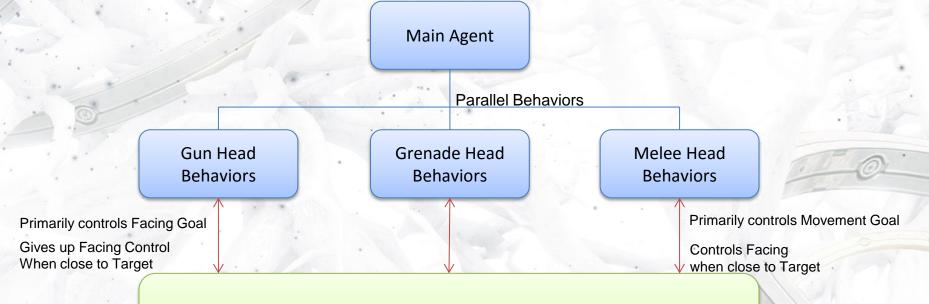


Destructible Parts

- Track damage to each head separately
- Hide destroyed head
- Cover with stub
- Hide swap with visual fx



Head Coordination



Blackboard Coordinates Movement Goal and Facing Goal

Physics & Collision Issues

- Can't use simple upright cylinder
- Need to run underneath it, but should collide with the legs
- Collision proxies attached to legs



No Safe Place

- Heads cannot attack below boss
- Needed new special attack
- Allow damage to other infested
- Cool option to deal with mobs



Lephantis In Action



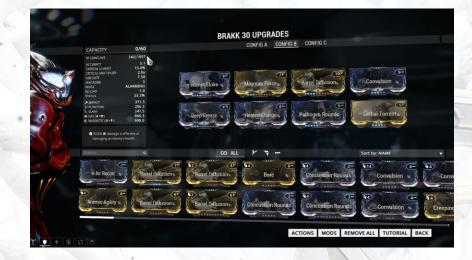
Balance and Scaling

- Need to support 1-4 players
- First timers and veterans
- Vastly different power levels



Balance and Scaling

- Score each item of player's loadout
- Scale Boss toughness and damage
- Gear still needs to matter
- Switching to more realtime, adaptive scaling

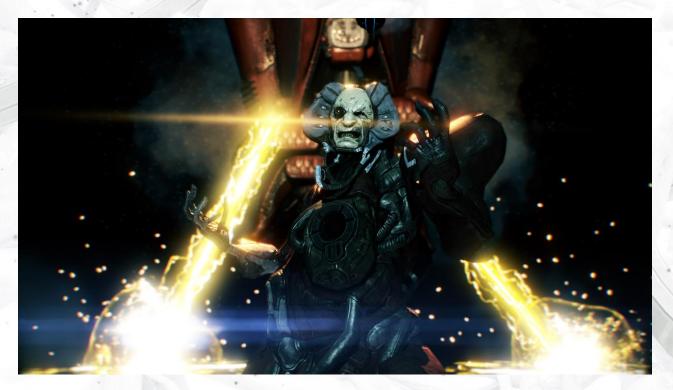


Introducing Trials

- 4-8 player missions
- Balanced towards hard-core veterans
- Multiple simultaneous goals
- Multiple roles to perform
- Diversify play-styles and loadouts



Questions?



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