

AI Post Mortem:

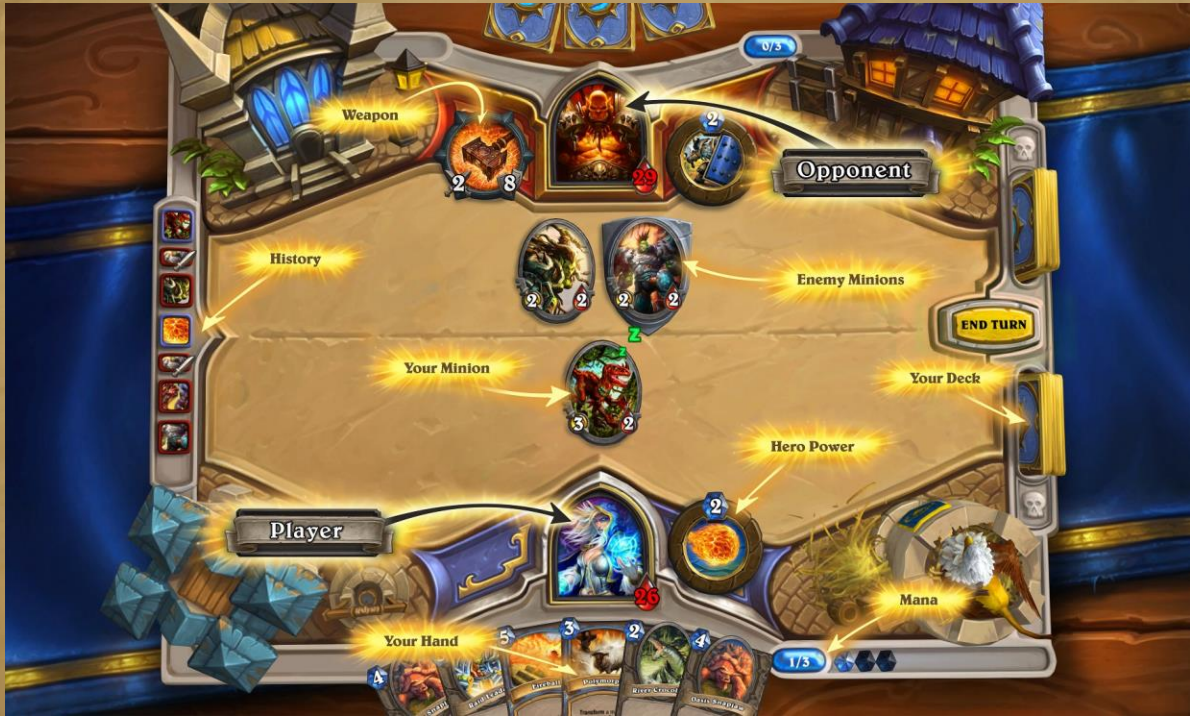


HEARTHSTONE

HEROES OF WARCRAFT™

The logo for the game Hearthstone is prominently displayed at the bottom. It features the word "HEARTHSTONE" in a large, stylized, metallic font with a glowing blue gem in the letter 'O'. Below it, the words "HEROES OF WARCRAFT" are written in a smaller, white, serif font, followed by a trademark symbol. The entire logo is set against a background of a torn piece of parchment.

The Game



Team 5

- 4 artists
- 5 programmers
- 2 producers
- 2 designers
- ...and a sound guy



Problem space

- Rules are objects in the game. Game is based on making new and breaking/modifying rules
- System need to handle insane amount of iteration. Blizzard factor, as well as balancing for a card game
- Small team, limited time, very small AI CPU budget

Considerations

- Design driven
 - Easy Creation/editing of cards
 - How much AI
 - Difficulty level of AI
- To Data or not to Data. ARGUMENT PRIMO
 - Cards are data
 - AI was not

Gameplay System

- Entities
 - Has attributes called Tags
 - Can only do things with Powers
 - Modifier power
 - Trigger power
 - Action power
 - Activate power
- Update State
 - Clear all modifiers and rerun them
 - Check for triggers, if anything then Update State
 - Check for deaths, if anything then Update State
- Main Loop
 - Get current options and send to player/AI
 - Run power associated with option taken
 - Update state





Startun == Reload Beretta M-92F

Hearthstone Editor

Asset Tools View Help

EX1_323 "Lord Jaraxxus" standard game CS2_122 "Raid Leader"

General Powers

Modifier Play Power (Power#0)

Power Information

Keyword: Aura

Reference Name: Power#0

Priority: 50

GUID: 0b60aef9-0ee0-4d18-a768-39a81ac74c64

Designer Notes:

Requirements & Preferences

CONDITION Script

START Script

UPDATE Script

Variables

Refresh [[[All Minions] controlled by [Your Player]] except [This Card]] with Enchantment [Enhanced]

Activity

Operation

Load entity tags

Status

Success

Creator

Tao Editor

Start

5:33:56.394 PM

Stop

5:33:56.678 PM

Seconds

0.284

Notes

9 X

AI system

- Designed to imitate intermediate player
 - Interviewed many different levels of players to identify the play style of an intermediate
- Piggybacks player options
- Very simple scoring system
- Two card kills are only preplanned combinations
- Very few holdbacks
- Difficulty leveling done a few ways
 - Metering of ai responses
 - Metering of ai mulligan
 - Adjustment of ai decks
 - Slight adjustment to a few ai percepts (momentum, target class, holdbacks)
- NO CHEATING, OMNISCIENCE, OR MUCKING WITH RNG

```
//-----  
int GameAIPerceptions::CS2_122()  
{//Raid Leader  
// minion  
    return EF_Aura(1,0,0,TT_FRIENDLY_MINIONS);  
}
```


Things that could have been better

- Slowish start code wise
- Tool maturity
- Bringing design behind curtain sooner

Things that worked out well

- Over a year of design iteration
- Flash Prototype
- Extended alpha and beta periods
- AI is crazy performant
- Game is pretty damn good

Questions?



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The logo for Hearthstone, a digital card game by Blizzard Entertainment. It features the word "HEARTHSTONE" in a large, stylized, metallic font with a glowing blue "O". Below it, "HEROES OF WARCRAFT" is written in a smaller, white, serif font. The entire logo is set against a dark, atmospheric background with a large green orc character and a small red-haired character looking up at it.

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