

# GAME AI: PERSPECTIVES FROM THE TRENCHES

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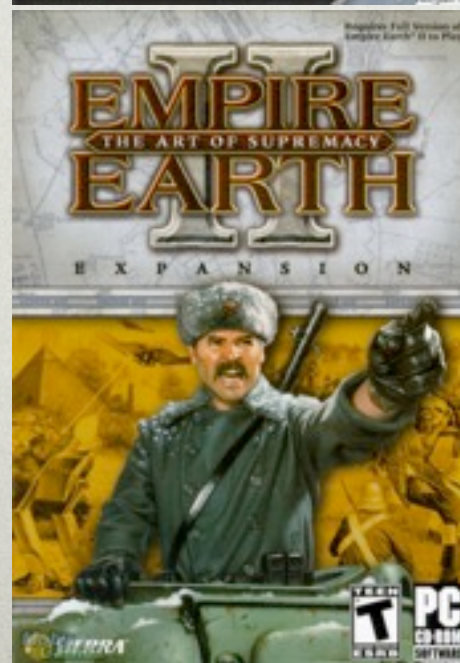
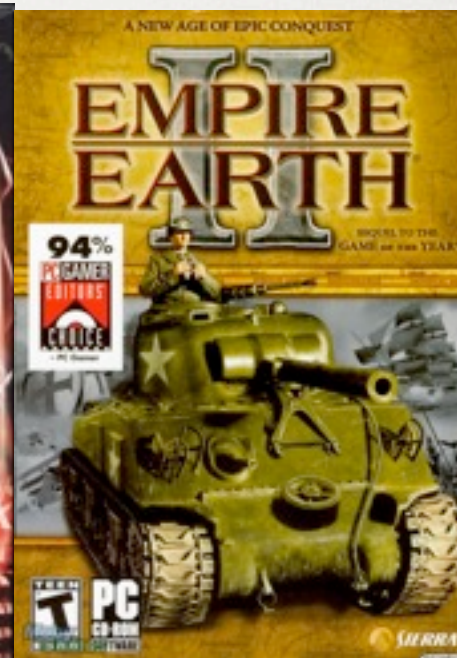
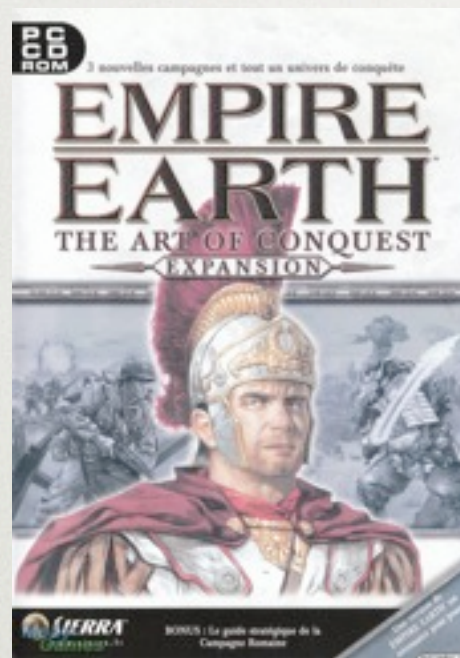
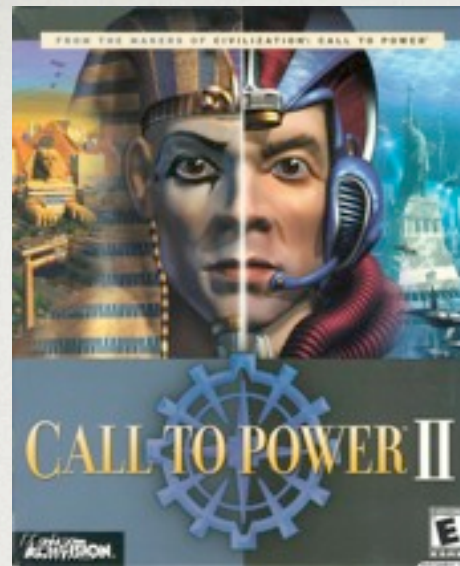
# ABOUT ME

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- BS in Computer Science from Northwestern in 2000
- 6 years at Mad Doc Software
- 2 years at LucasArts
- 2 years at Double Fine









# OVERVIEW

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- Goals of an AI programmer
- Constraints
- Case Studies



# GOALS OF AN AI PROGRAMMER

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- Not to make cool AI
- Not even to make smart AI
- Everything is in service of the game and the gameplay
- The goal is to help create fun



# STAR TREK: ARMADA 2

## DATA DRIVEN

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# STAR WARS: TFU

## TIME TO LIVE

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# STAR WARS: TFU

## WORK IS DISPOSABLE

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# CONSTRAINTS

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- Schedule
- Budget
- System resources
- Team dynamics



# SCHEDULE

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- Unknown tasks equal unknown time and unknown results
- Finishing on time can be more important than doing it better



# BUDGET

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- AAA titles are a business
- If they aren't profitable, they won't make more
- Slipping your schedule increases the budget



# SYSTEM RESOURCES

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- AI isn't the only system
  - Graphics
  - Audio
  - UI
- Depending on your target system, you may have very little to work with



# WORKING WITH DESIGNERS

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- Designers are deciding what features they require of you
- Designers like to change their minds
- Don't let a designer dictate how you implement it, always ask them what is the experience they want



# CASE STUDIES

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- The job of AI programmer is very different in different genres of game



# RTS: EMPIRE EARTH 2

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- High level gameplay
- Top down view
- Large scale decisions
- Tactical and Strategic AI





# RTS: EMPIRE EARTH 2

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- Unit Movement
- Formations
- Pathfinding
- Pathfollowing





# RTS: EMPIRE EARTH 2

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- Many managers
- Build
- Resource
- Army





# RTS: EMPIRE EARTH 2

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- FSM
- A\* and flood fill
- Grassfire algorithm
- Designer tunable build orders





# ACTION: STAR WARS: TFU

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- Human sized scale
- Animation fidelity is crucial
- High degree of physical realism (within fantasy world bounds)





# ACTION: STAR WARS: TFU

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- Simple FSMs
- Data driven abilities
- AI agents have simple visibility systems
- Voice cues





# BRÜTAL LEGEND

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# GAMES ARE AN INDUSTRY

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- AAA games must be profitable
- Innovation and invention can be costly and risky
- There is occasional room for trying new techniques, but usually only in the hands of a programmer and / or studio with a proven track record



# HALO 2

## BEHAVIOR TREES

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# F.E.A.R. PLANNER





# RESOURCES

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- Damian Isla's behavior trees
- <http://www.bungie.net/Inside/publications.aspx>
- Jeff Orkin's F.E.A.R. planning system
- [http://web.media.mit.edu/~jorkin/gdc2006\\_orkin\\_jeff\\_fear.pdf](http://web.media.mit.edu/~jorkin/gdc2006_orkin_jeff_fear.pdf)
- Civ IV source code
- <http://www.2kgames.com/civ4/downloads.htm>



# CLOSING THOUGHTS

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- Main requirement for making AI is passion and communication skills
- We are bringing the game to life, we need flexibility and the commitment to try until it feels right
- AI programming is improved by knowledge of innovations and the future will hopefully bring large changes