

## Addressing the Need for a Java Game Curriculum

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## Computer Games

- In 2004, game sales reached \$7.4 billion
  - More than doubled since 1996
- NES
  - Released in 1985 (USA)
  - Around for many students' memorable lifetime



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## Games in Academia

- Various Types of Institutions
  - Colby College
  - University of Michigan
  - Universiteit Utrecht (The Netherlands)
- Various Levels of Curriculum
  - Capstone to CS1 through Master's level

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## Why Computer Games?

- Pander to student interests
- Everyone else is doing it
- Leverage student's interest
  - Increased project relevance
  - Increased retention (perhaps)
- Perfect platform for synthesis projects
  - Networking, algorithms, AI, software engineering

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## Our History



- A special topics course in Computer Game Design offered at WSU Vancouver in Fall '05
  - Not well advertised
  - 4 students (seniors, masters students)
  - Various levels of motivation (some – some more)
  - Perfect dry run
- Game engine borrowed from Colby College
  - Not in active development
- No textbook
  - Seemed to make students quite nervous

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## Lessons & Questions



- Game engine is important
  - Provides foundation for less motivated students
  - Highly motivated students can go beyond the engine
  - Can provide the basis for class discussions
    - Should be consistent with text
- Were **our** students really interested?
- How could we support them more appropriately
  - Especially marginally motivated students...

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## Our Schools



- WSUV
  - Junior / Senior / Masters
  - Non-traditional students
  - Becoming four year...
- UPS
  - Small liberal arts setting
  - Where to add games?

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## Assessment of Interest



	Projects in 1 <sup>st</sup> /2 <sup>nd</sup> year	2 <sup>nd</sup> /3 <sup>rd</sup> year course	3 <sup>rd</sup> /4 <sup>th</sup> year course	vs. other CS courses
<i>Avg</i>	<b>6.7</b>	<b>8.8</b>	<b>8.8</b>	<b>8.7</b>
<i>Stdev</i>	<b>2.9</b>	<b>1.7</b>	<b>1.6</b>	<b>1.8</b>
<i>N</i>	<b>31</b>	<b>32</b>	<b>32</b>	<b>30</b>

0: no interest      10: extreme interest

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## The interest is there...



- Next, survey engines to support course goals
- Want to create better Computer Scientists
  - Not “entertainment industry specialists”
- Synthesis vs. new material
- Want to support student learning outside the classroom

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## Language Considerations



- C++ is most industry relevant language
- UPS and WSUV curriculum centers on Java
- High school AP exam is in Java
- Java much more prevalent in CS1/CS2
- For highly motivated students this is secondary, but not so for less motivated ones

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## 2D / 3D Considerations



- 3D is the industry relevant choice
- Both UPS and WSUV offer junior/senior graphics courses on OpenGL & 3D graphics
  - Don't want a duplicate class
- What is the emphasis for a games class?
  - 2D graphics are more accessible
  - Upper level students will have more time for other features

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## Our Desires



- |                            |                     |
|----------------------------|---------------------|
| • Language                 | <b>Java</b>         |
| • 2D/3D Focus              | <b>2D</b>           |
| • Intended Audience        | <b>Students</b>     |
| • Cost & Licensing         | <b>Low, or None</b> |
| • Source Code Availability | <b>Yes, Open</b>    |
| • Documentation            | <b>Yes</b>          |

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## Engines in Academia



- Torque Engines
  - C++/Torque script, 2D/3D, \$50/seat with source
- DXFramework (U. Michigan)
  - C++, 2D (3D), open source, minimal docs
- SAGE (U. North Texas)
  - C++ 3D, beta docs & tutorials, unlicensed source
- GEDI (Marist College)
  - C++, 2D, early in development, unlicensed source

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## Where are the Java Engines?



- Turning to Google...

DevMaster database	Java games middle-ware	top 100 "java game engine"	Active Java engines	Active 2D Java engines
6 (10)	4 (12)	4 (7)	14	2

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## The Candidates...



- Genuts
  - Aimed at mobile devices
  - Limited infrastructure for more sophisticated apps
  - Limited documentation and tutorials
  - Free, but no source code
- GTGE
  - Suitable for more advanced games
  - Documentation and tutorials evolving (still new)
  - Free, but no source code

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## An Unfilled Niche



- We are collaboratively building JIGE
  - Java implementation
  - 2D emphasis
  - Open source
  - Academic focus, multi-campus development
- *Intended to support a dedicated class*
- *Intended to support isolated game projects*

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## Supporting Existing Courses



- Modular architecture
- Want to be able to 'pop in' new features
  - To the engine itself
  - To demonstration games
- Course projects
  - We create initial game
  - Students create isolated plug in module/class
  - Don't need to go into 'game programming'
  - But the project is visually representative of task and engaging

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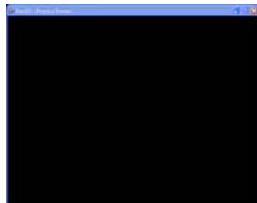
## Current Status



- Not quite ready for prime time
  - Basics implemented, but demos are not rich
- Applied for NSF CCLI grant in mid May
  - Work redirected from engine to grant
- WSU Pullman students led grass roots effort to get game class via teleconferencing system
  - This year's course is taught in a combination of languages
  - Java, C++ (DXFramework)
  - Intend to incorporate this experience into JIGE

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## Jige Physics Demo



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## JIGE -- Graphics



- Abstraction of graphics & drawing primitives
  - Image classes
  - Offscreen buffers
  - Coordinate system transforms
- Multiple back ends via abstract factory
  - Java 2D
  - Open GL (via LWJGL)

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## JIGE -- Physics



- Two supplied physics engines
  - Simple (sprite level physics)
  - More complex ('real' physics model)
    - Based on Erin Catto's 2006 GDC presentation
  - Provide physical laws of game environment
  - Detect collisions between objects
- Designed to be redesigned (by students)
  - This is a primary design consideration for the engine as a whole

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## Supporting Synthesis



- Dedicated classes offered at WSUV
- Planned for UPS
  
- Engine provides foundation for student work
- Expected that some students will modify it
  
- Audience: late sophomores to seniors

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