3D GAME PROGRAMMING

presented by:

EACOMM Corporation

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Corporate Profile

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EACOMM Corporation is a comprehensive IT solutions provider.

- EACOMM was founded in 2001 with a mission to provide low-cost IT solutions to small and medium scale enterprises in the country.
- EACOMM has two offices:
  - 12th Floor IBM Plaza Building, Eastwood City Cyberpark, Libis, Quezon City
  - Suite 304, Eagle Star Condominium, Loyola Heights, Quezon City
- EACOMM has four main divisions: Multimedia/Web, Software, Training, and Embedded Systems

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- **Multimedia and Web Division:**
  - Web Development
    - Static Website Development
    - Interactive Website Development
    - E-commerce Website Development
  - Multimedia Authoring and Development
    - CD-ROM Authoring
    - Information Kiosks
    - Game Programming
- **Software Development Division**
  - Financial Planning System
  - Custom Software Solutions

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- **Embedded Systems Division**
  - Wireless Data Transmission Systems
  - Micro-controller based design and development
  - LED/LCD Display Systems
  - Custom Hardware/Software Solutions
- **Training Division**
  - Short Courses / Workshops on multimedia and web development skills and theories
  - Web and Multimedia Developer Certification programs (Early 2004)

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Why Author in Director MX?

1. WYSIWYG Development Platform
2. Easy to use and learn
3. Powerful Object Oriented pseudo programming language (Lingo)
4. Capable of directly importing a variety of file formats and types.
5. Built-in 3D Engine
6. Cross-platform Development Platform
7. Deployable On-line as a Shockwave Application
8. Fast development time

Why (Not to) Author in Director MX?

Disadvantages:

- Produces slower running applications than coding in C/C++
- Requires relatively high system requirements for end-user
- For very big, ambitious projects, Director and Lingo just won't cut it.
- Requires a "Made by Macromedia" logo on the delivered software.

Other Authoring Options

Darkbasic (www.darkbasic.com) - Programming environment catered specifically to game development. Darkbasic is a derivative of the BASIC programming language. Cheap and supposedly easy to learn.

CrystalSpace (crystal.sourceforge.net) – Opensource 3D engine and development platform written in C++. Available for Linux, Windows and Mac. Knowledge of C/C++ required.

Check out www.sourceforge.net and/or www.gamedev.net for more information regarding 3D engines, and authoring environments.

Game Development Methodology

- Planning and Storyboarding
  - Designing a Non-linear story.
  - Challenge and Reward
  - Designing the characters, and their motivations
  - ***Developing a Marketing Plan***
  - Determine target audience and target platform(s)
- Conceptualization, layout and design
  - Gradually progress from napkin drawings to 3D Models
  - Screen and Scene designs
  - Character models
- Initial Programming
  - Develop an "Alpha" version to test your various designs and plans
  - Get feedback and opinions as early as possible
  - Test and Debug!!!

Game Development Methodology

- Media Collection and Integration
  - Populate your game with sounds, animations, videos and others.
- Beta Version Development
  - Develop your working prototype for Beta Release.
  - Continuously test the software and game concept on a variety of audiences.
  - Cyclical process, test->program->test->program, until you are confident of your work.
  - Don't be afraid to go back to step one. Blizzard Philosophy: Better to not release a game than release a lousy one.
- Publication and Distribution
  - CD-ROM Duplication
  - Package Design
  - "Discouraging" Piracy
  - Distribute yourself or get a distributor?

Common Concepts/Issues in 3D Game Programming

Common Game Algorithms

THE ISOMETRIC (TILE-BASED) ENGINE:

- "God" View.
- Used extensively in games such as: Most Real Time Strategy Games (C&C, Starcraft, Warcraft II), Some Role Playing Games (Baldur's Gate, Fallout, etc.), and simulations (The Sims, SimCity 2000, etc.)
- Creates a "False" 3D environment or a mixture of 3D and 2D elements.
- Much faster engine than a "true" 3D engine. (Lower system requirements)
- All elements can be dynamically created. (e.g. random maps)
- Can create a level of detail and realism not easily realizable in true 3D games.

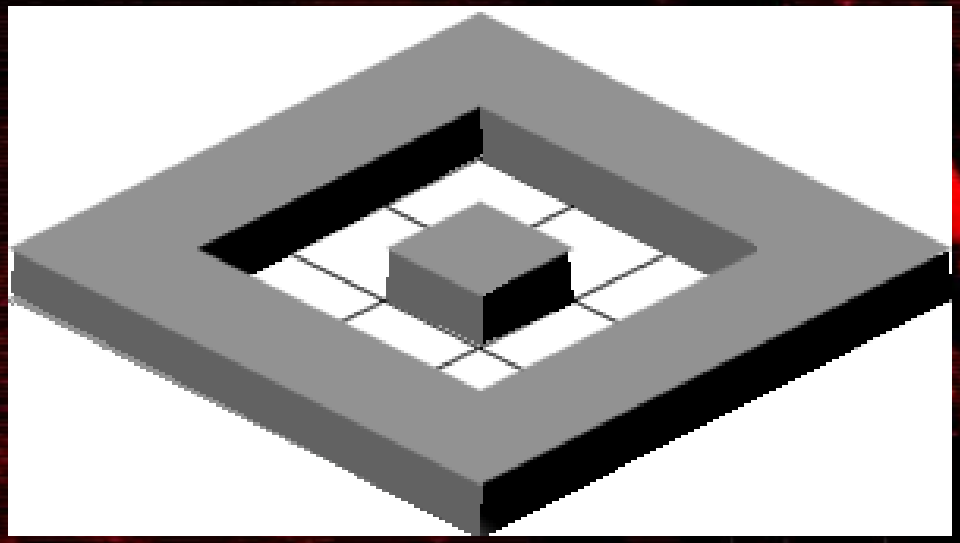
Common Game Algorithms

THE ISOMETRIC (TILE-BASED) ENGINE:

- Essential Elements:
  - The Map Array: A 2-dimensional array of integers that represents the map appearing on screen.

    A 5x5 Map Array:
    - (1,1,1,1,1),(1,0,0,0,1),(1,0,1,0,1),(1,0,0,0,1),(1,1,1,1,1)
    - Where 1 represents a wall, this maparray will render to the image below:

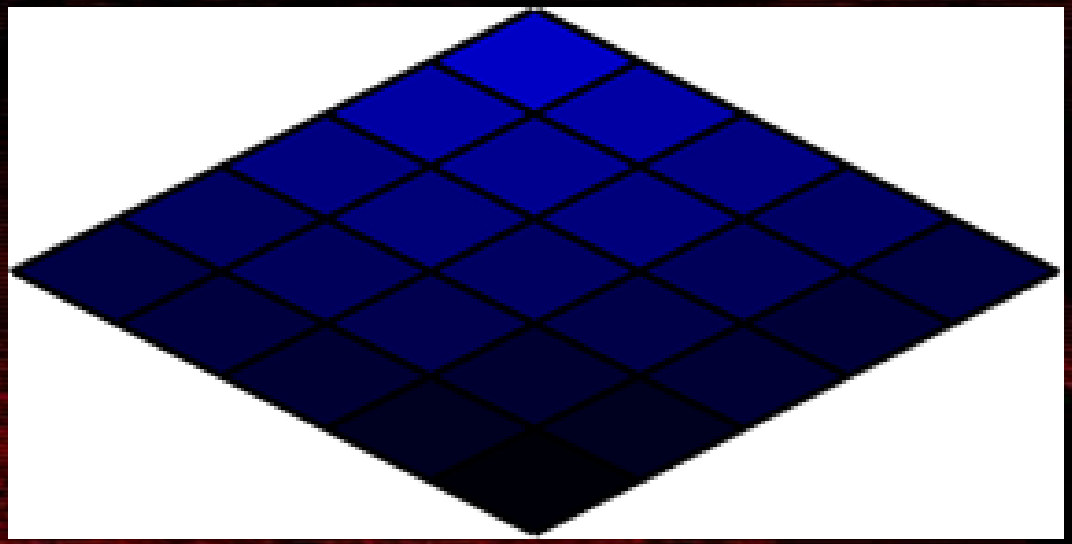
1	1	1	1	1
1	0	0	0	1
1	0	1	0	1
1	0	0	0	1
1	1	1	1	1



Common Game Algorithms

THE ISOMETRIC (TILE-BASED) ENGINE:

- Essential Elements:
  - The Color Map: The color map is used to detect mouse clicks on the isometric map. Each map tile is represented by a known, unique color.
  - A 5x5 Color Map Array:



Common Game Algorithms

THE ISOMETRIC (TILE-BASED) ENGINE:

- Essential Elements:
  - Animation
    - ✓ To show animation in an isometric engine, “image sequences” are used. Eight main animation sequences are created, representing 8 points of the compass.

Common Game Algorithms

THE ISOMETRIC (TILE-BASED) ENGINE:

- Essential Elements:
  - **Collision/Object Detection in an Isometric Engine.**
    - ✓ **Each object is assigned an integer that represents it in the map array. (e.g. 1=wall, 2=Non-player character, 3=house, etc.)**
    - ✓ **Since everything lies on *at least* one tile, the program need only identify the clicked/target object by checking the map array.**
    - ✓ **Thus an object such as a wall can be programmed to be unpassable or another object can initiate a new action.**
    - ✓ **Sample Collision/Detection Algorithm:**
      1. **Wait for click/target selection.**
      2. **Identify click/target from map array**
      3. **Case:**
         1. **If target=1 then it is a wall. Disallow character to walk over it.**
         2. **If target=2 then it is a NPC. Initiate dialogue routine.**
         3. **If target=3 then it is a house. Load house interior.**
         4. **Etc.**
      4. **And so on…**

Common Game Algorithms

PATH DETECTION:

- ✓ Path detection is a very useful algorithm that can be seen in most RTS, RPG, and 3D games.
- ✓ A commonly used path detection algorithm is the A* Algorithm or A-Star.
- ✓ Takes advantage of the grid-nature (2D-map array) of game maps. It can be used for both 2D and 3D games.
  - Since there is a grid with grid coordinates, A* takes advantage of this knowledge to provide a fast determination of the path from origin to target.

Common Game Algorithms

PATH DETECTION:

- ✓ A* generates "estimates" on how "costly" each step towards the target is going to take. It then chooses the "least costly" method to reach the target.
- ✓ A* is ideal for games in that it can be "tweaked" so that it does not necessarily obtain the "perfect" path to a target.
- ✓ A* can also take into account "terrain effects" defined by the map array. (e.g. walking through water or forest areas can be defined as slower than walking on a clear path or road)
- ✓ A* is a fairly complex algorithm. Fortunately, there are examples and source codes available in the Net.

Q and A

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