PARSEC: Enhancing Realism of Real-Time Graphics Through Multiple Layer Rendering and Particle Systems

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PARSEC

- 3-D space fight game, multiplayer only
- Four simultaneous players, IPX protocol
- DOS and Win32 versions
- Software renderer
- Hardware renderer on Voodoo Graphics
- Full view panoramic background
- BSP trees for object visibility
- Particle system for special effects

Panoramic Background

- Cubic environment map for nebulae, stars, and detail objects (planets, suns)
- Pre-rendered with POVRay
  → Absolutely correct perspective
  → No noticeable seams at cube edges
- Two different texture resolutions for stars and nebulae!

Compositing Nebulae and Stars

- Nebulae cube:
  Six unique 256x256 RGB-textures.
- Stars cube:
  One 256x256 alpha-only texture, replicated 24 times (4 per side). Tiling not noticeable.
- Composition by alpha-blending bilinearly filtered textures: Stars rendered as effectively antialiased points.

Detail Objects

- Avoid high-resolution textures for planets:
  No actual cube, only patches!
- Use of arbitrary pre-rendered bitmaps:
  Perspective back-projection onto cube
- Two different layers:
  Cubic layer plus spherical layer for glare

Polygonal Objects

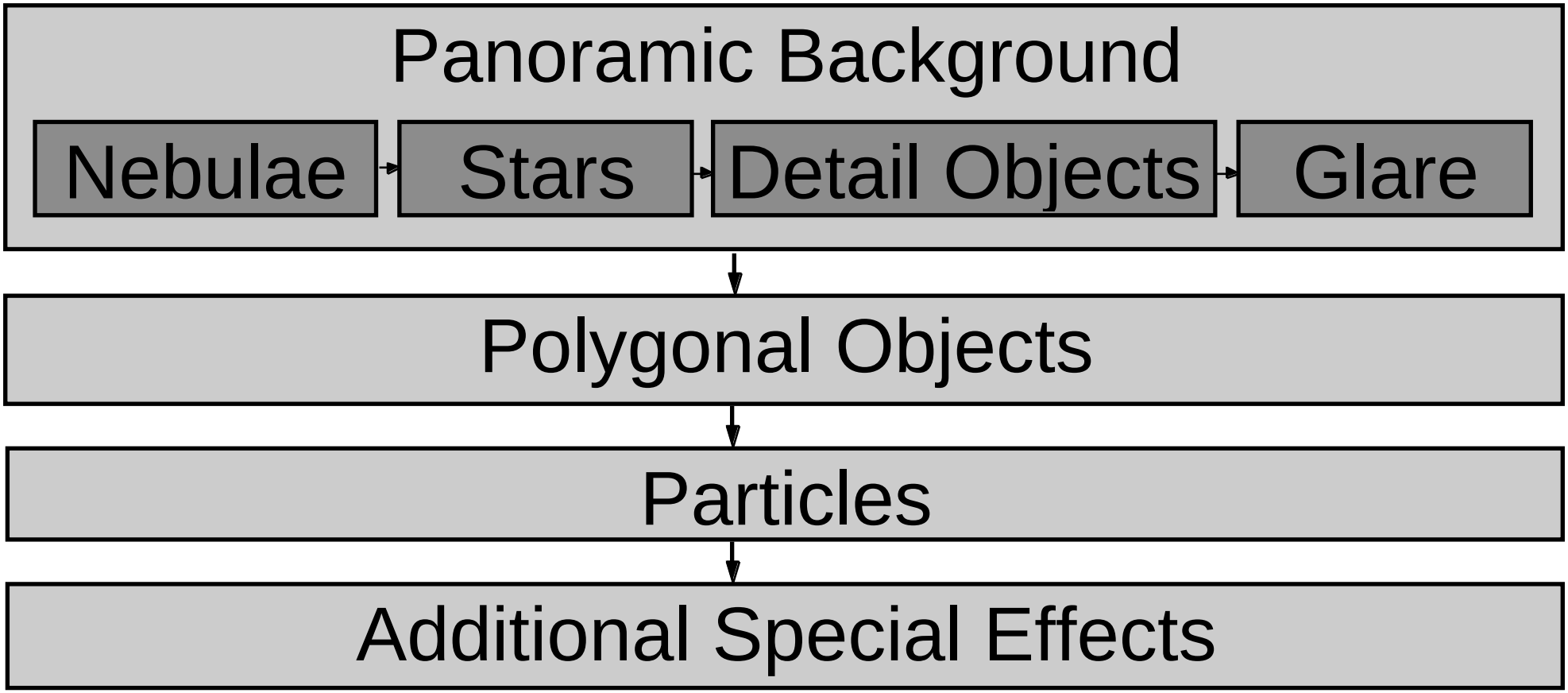
- Space-ships rendered using object-local BSP trees.
- Simple depth-sort to determine inter-object visibility
- Polygon rasterizer fills depth-buffer to enable rendering particles later on
- Texture-mapper and depth-buffer fill decoupled to maximize performance

Particle Systems

- Particles are semi-transparent texture-maps scaled according to view-distance
- Constant z for each particle yields simple and fast visibility determination
- Behavior defined by many attributes

Examples: Explosions, Lightning, Protective shields, Energy fields, Particle weapons, ...

Layer Summary



The Future

- Exploit hardware acceleration even more: only 16-bit textures and particles, ...
- TCP/IP network server for internet gameplay
- Smooth Levels of Detail technology

News and released versions will be available from:

http://www.cg.tuwien.ac.at/~msh/parsec.html