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## Parallel Rendering

**Molnar, Cox, Ellsworth, and Fuchs.**  
**“A Sorting Classification of Parallel  
Rendering.” *IEEE Computer Graphics  
and Applications*. July, 1994.**

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## Why Parallelism

### **Applications need:**

- **High frame rates**
- **High resolution**
- **Large geometric models**
- **Stereo**
- **Antialiasing**
- **etc.**

### **Performance implications:**

- **Hundreds of MFLOPS compute power**
- **Gigabytes per second memory bandwidth**

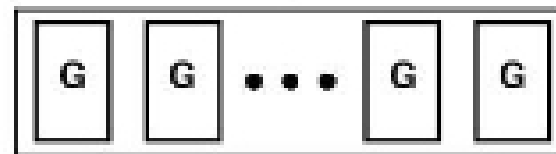
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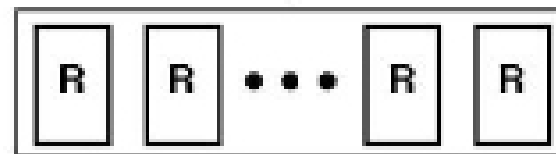


## Stages of Parallelism

Graphics database traversal



Geometry processing



Rasterization



Display

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## Processing Tasks

### Geometry Processors

- Each processor gets a subset of primitives
- Transformation
- (Lighting)
- Set-up for Rasterization

### Rasterization Processors

- Each processor gets a subset of pixels
- Visibility computation
- Shading

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## Rendering as Sorting

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- Primitives may lie anywhere on or off screen
- Determine effect of each primitive on each pixel
- Primitives are “sorted” onto screen
- Sorting affects distribution of data on geometry and rasterization processors

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## Primitives in Screen-space Regions

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