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# **Stanford Real-Time Programmable Shading Project**

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**<http://graphics.stanford.edu/projects/shading/>**

**(joint work with Bill Mark, Svetoslav Tzvetkov, and Pat Hanrahan)**

## **Motivation**

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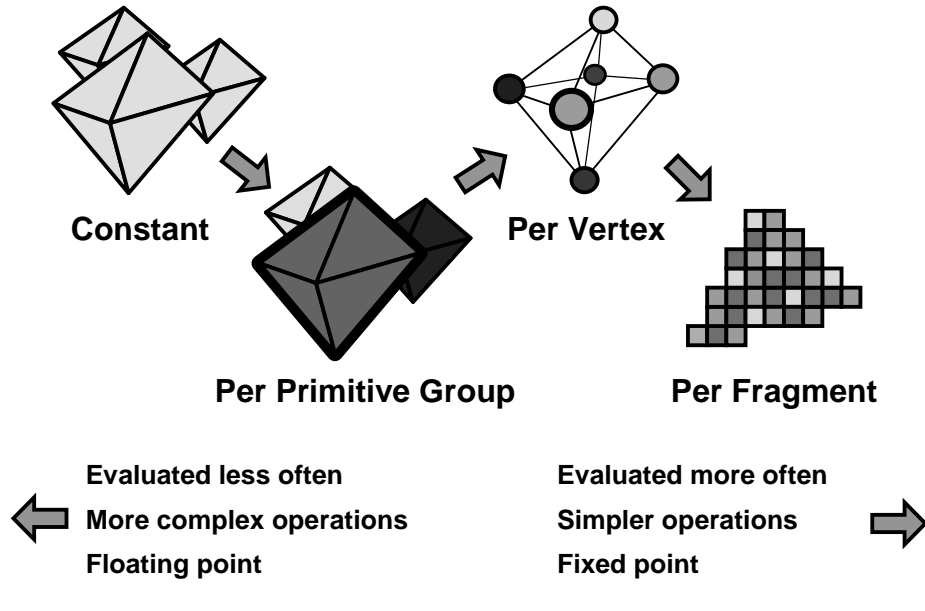
### **Real-time shading languages**

- **Easy-to-use, high-level interface to hardware**
- **Shader compilation results in platform independence**
- **Fast exploration of interesting new effects**

### **Multipass rendering is not enough**

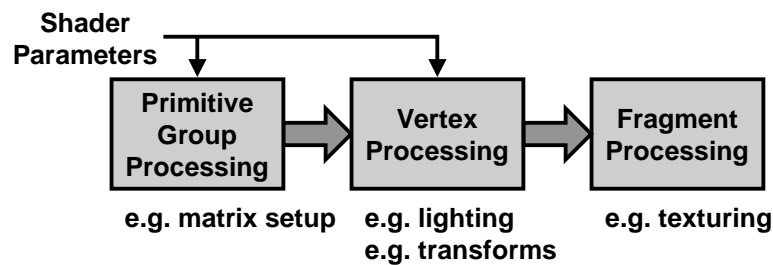
- **Fragment processing is expensive**
- **Today's fragment operations are limited: fixed point, simple operators**

## Multiple computation frequencies



## Programmable pipeline abstraction

A framework for multiple computation frequencies



### Programmable pipeline

- All stages may be fully programmed

### Traditional pipeline

- Fixed but configurable processing
- Fragment programmability enabled by multipass

## **A shading language**

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**A shading language is the user-level interface to pipeline programmability**

**Language highlights**

- **C-like syntax for computations**
- **Scalar, vector, matrix types and operators**
- **Automated (but user-controllable) management of computation frequencies**
- **Support for surface and light shaders**