

# 30 Metal Performance Shaders

## Overview

### The Sobel Filter

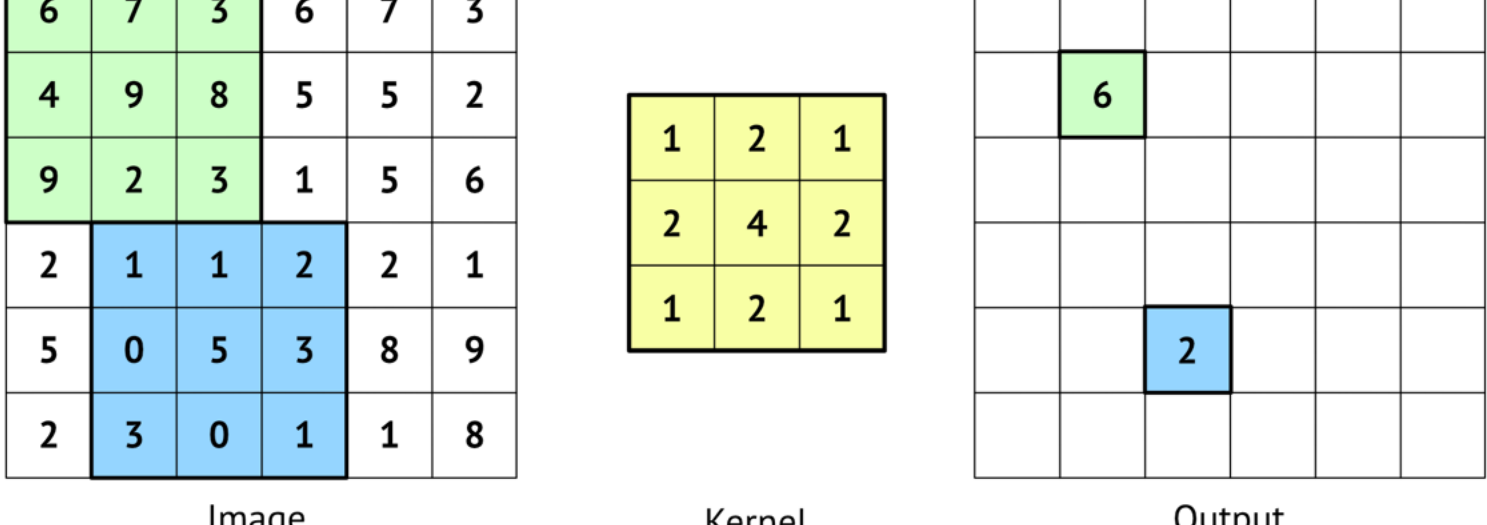


The Sobel filter

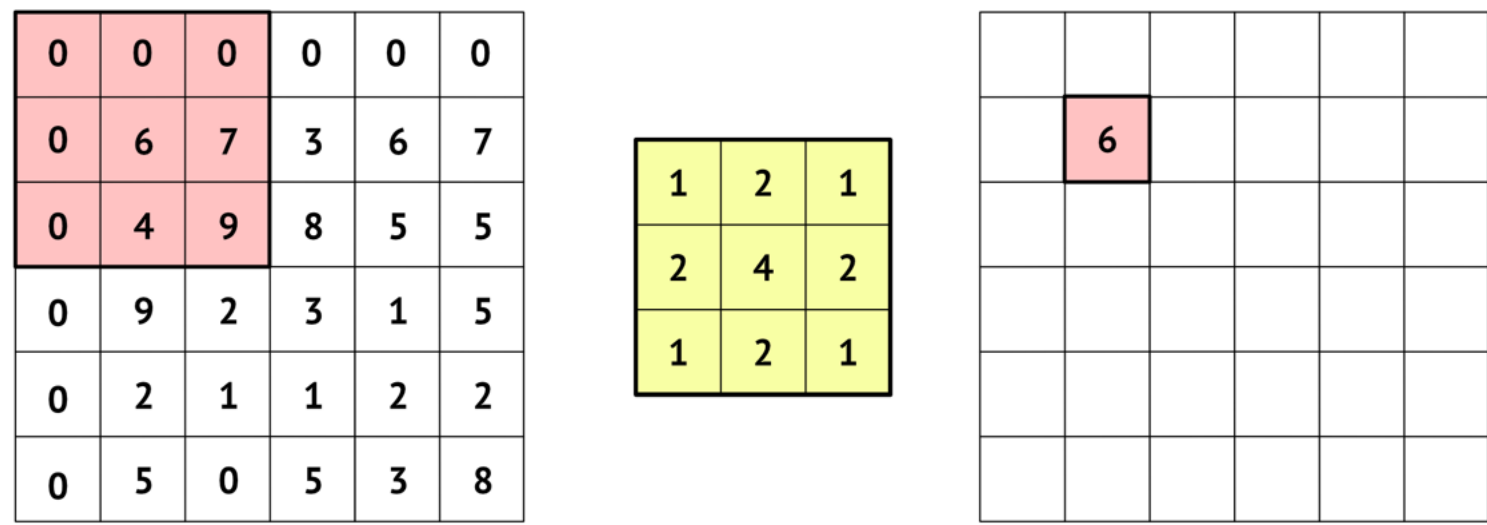
### Image Processing

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$

A Gaussian blur matrix

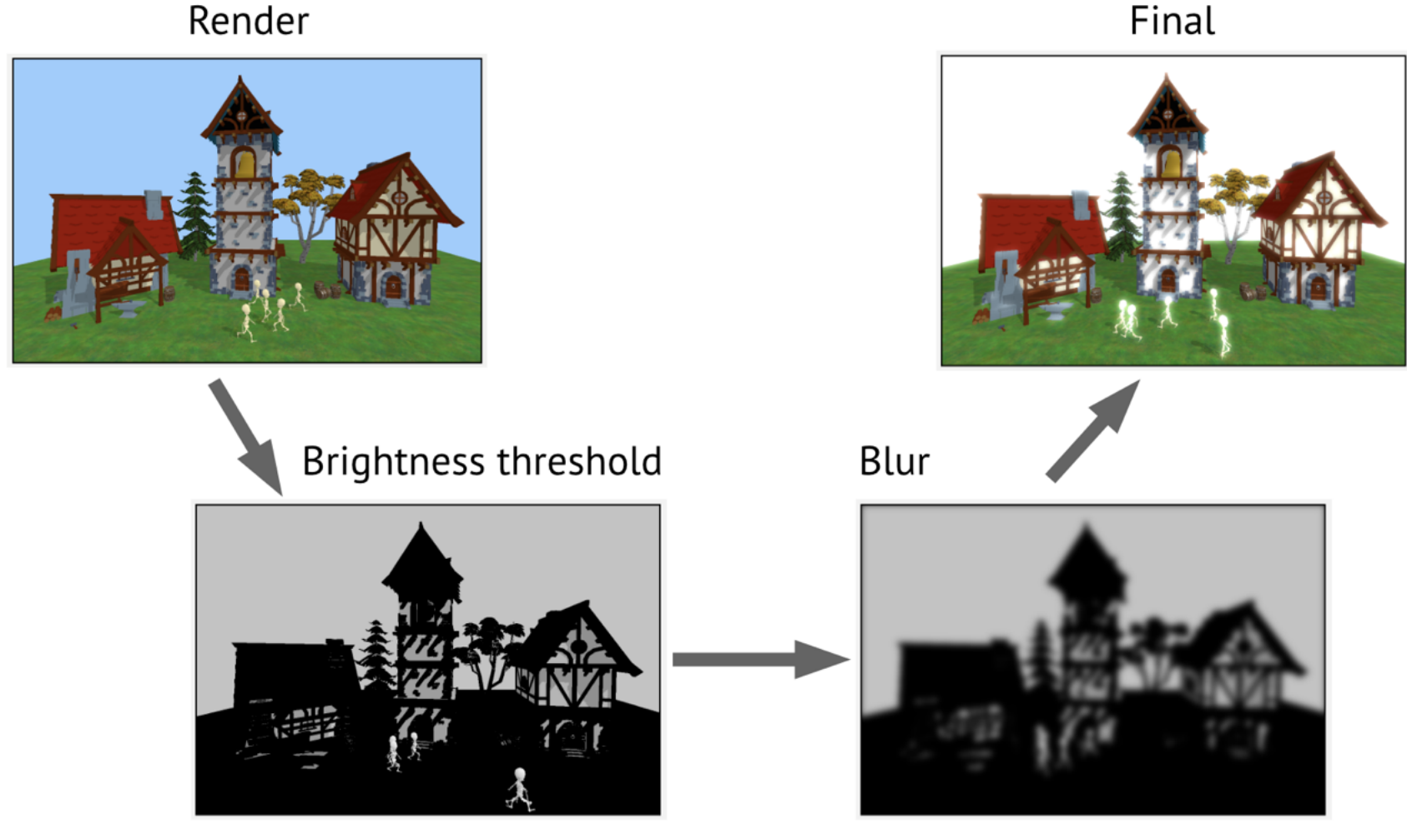


Convolution



Convolution applied to border pixels

### Bloom



The bloom effect

### The Starter Project



The starter app

### Setting Up the Textures

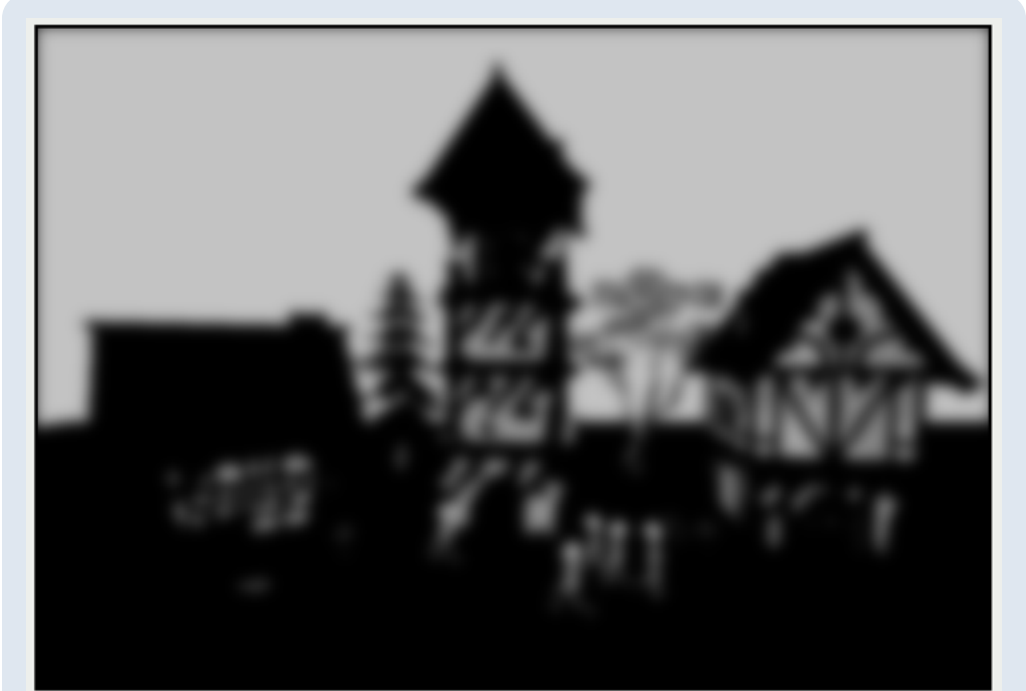
#### Image Threshold to Zero

#### The Blit Command Encoder



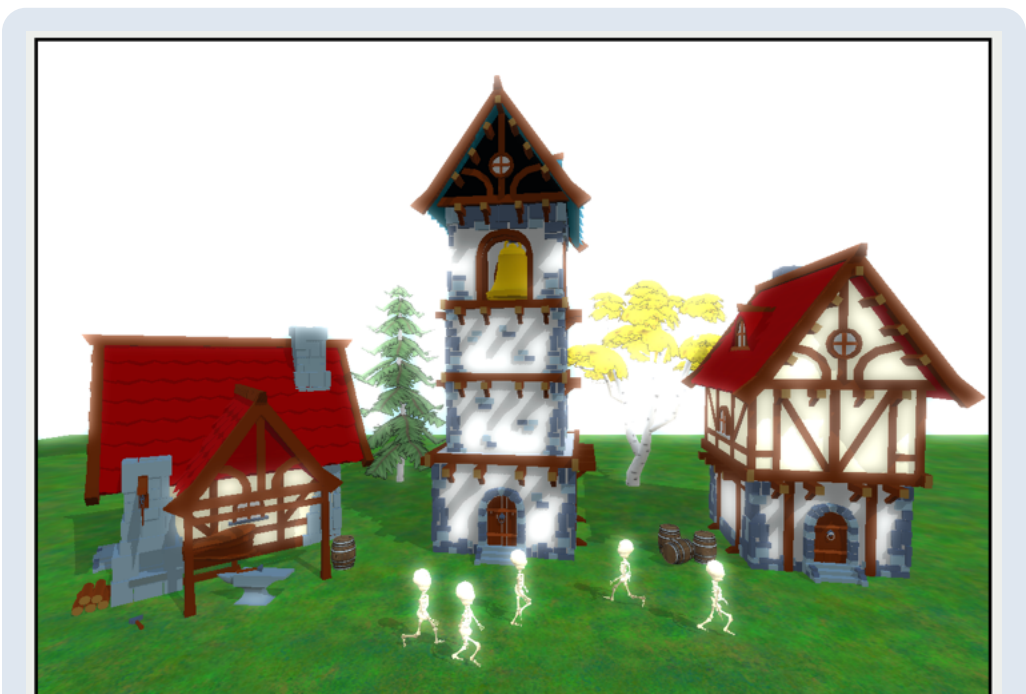
Brightness threshold

### Gaussian Blur



Brightness and blur

### Image Add



Brightness, blur and add



Glowing skeletons

### Matrix / Vector Mathematics

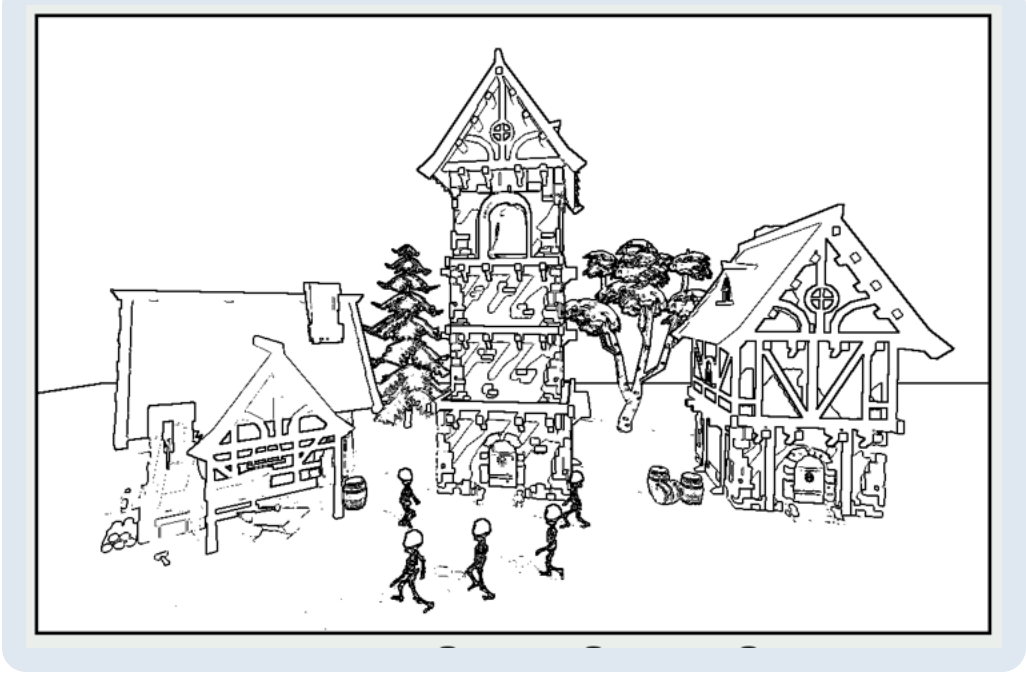
```
(0..
```

Show result

```
(0..
```

Value history

### Challenge



Outline