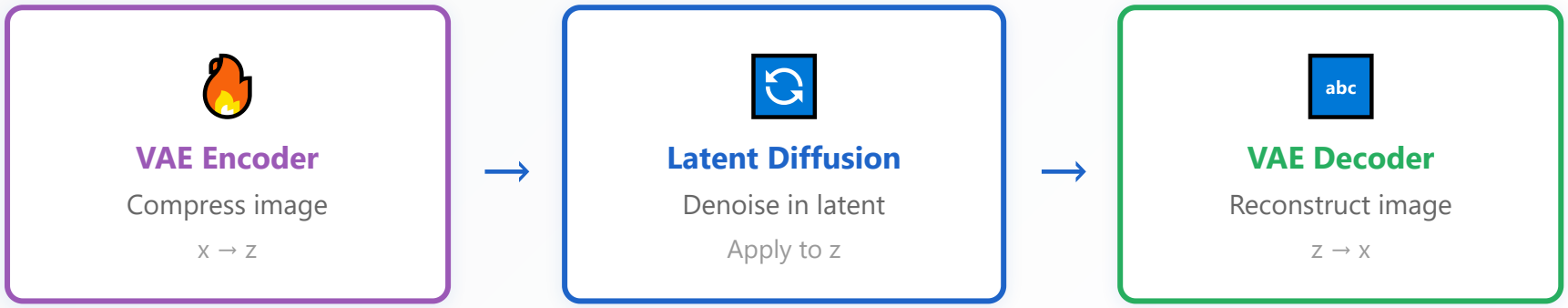
Latent Diffusion (Stable Diffusion)

Part 6/7: Advanced Techniques

⚠️ Motivation: Pixel-space diffusion is computationally expensive



Efficiency
64x speedup

Compression
8×8 reduction

Quality
Perceptual loss

Memory
Consumer GPUs

🎨 Stable Diffusion: Open-source latent diffusion model — High-resolution generation

📊 Practical Example: 512×512 Image Generation

Pixel-space Diffusion

Input size: `512 × 512 × 3 = 786,432`

VS

Latent Diffusion (8× compression)

Compressed size: `64 × 64 × 4 = 16,384`

Memory per step: ~3 MB

50 steps total: ~150 MB ✗

Memory per step: ~65 KB

50 steps total: ~3.2 MB ✓

Memory Reduction: 48× | Speed Improvement: 64× | Quality: Preserved via perceptual loss

Interactive Demo: **Diffusion Explainer**