Conditional GAN (cGAN)

Conditional Architecture

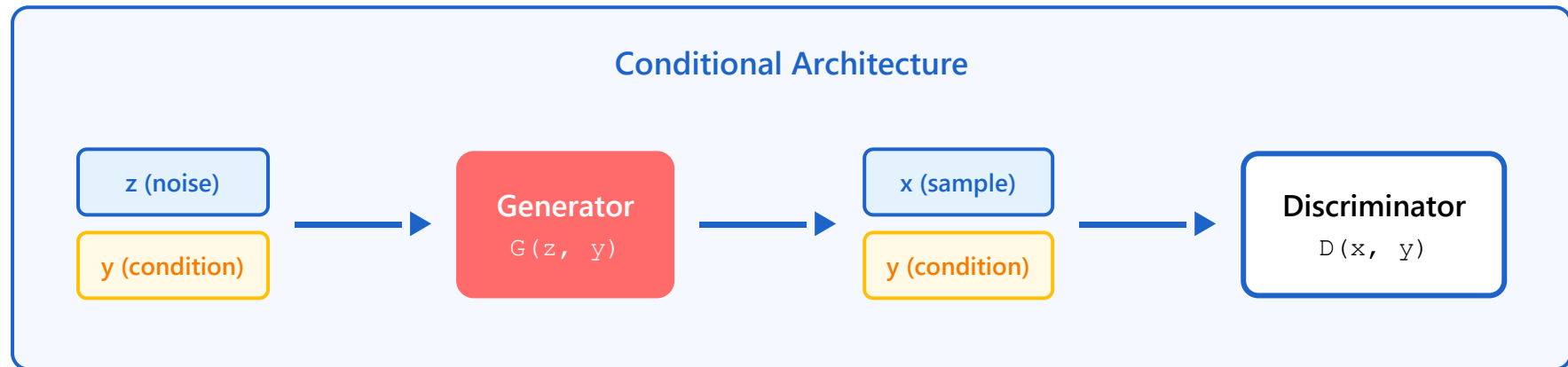| z (noise) | → | **Generator**
$G(z, y)$ | → | x (sample) | → | **Discriminator**
$D(x, y)$ |
| y (condition) | | | | y (condition) | | |

Key Idea: Both G and D are conditioned on additional information y

Conditioning Types

y can be: class labels, text descriptions, images, or any structured information

Core Concept

Condition generation on additional information to enable controllable and targeted output

Applications

- Class-conditional generation
- Image-to-image (Pix2Pix)
- Text-to-image synthesis
- Super-resolution

✓ Key Benefit

Controllable generation capabilities - direct control over output characteristics

- Style transfer

📄 **Original Paper**

Conditional Generative Adversarial Nets

Mehdi Mirza, Simon Osindero (2014)

🔗 **View on arXiv**