

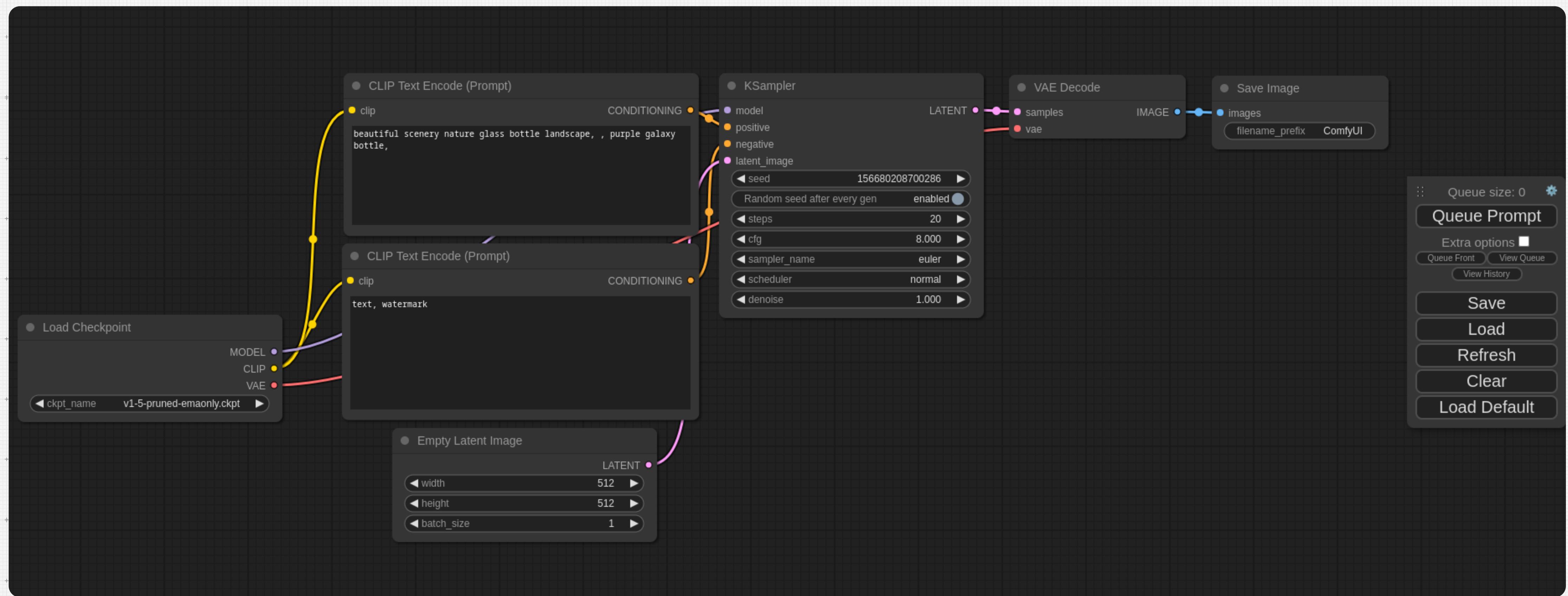
100xEngineers

Lecture 11

Beginner's Guide to ComfyUI for Stable Diffusion

**What is ComfyUI
and What does it do ?**

ComfyUI is a node-based user interface for stable diffusion



ComfyUI vs AUTOMATIC1111

Automatic1111:



ComfyUI:



Why would you use such a complicated tool to do the same thing?

**1. Extreme
configurability**

**2. Performance
and speed**

How to install ComfyUI

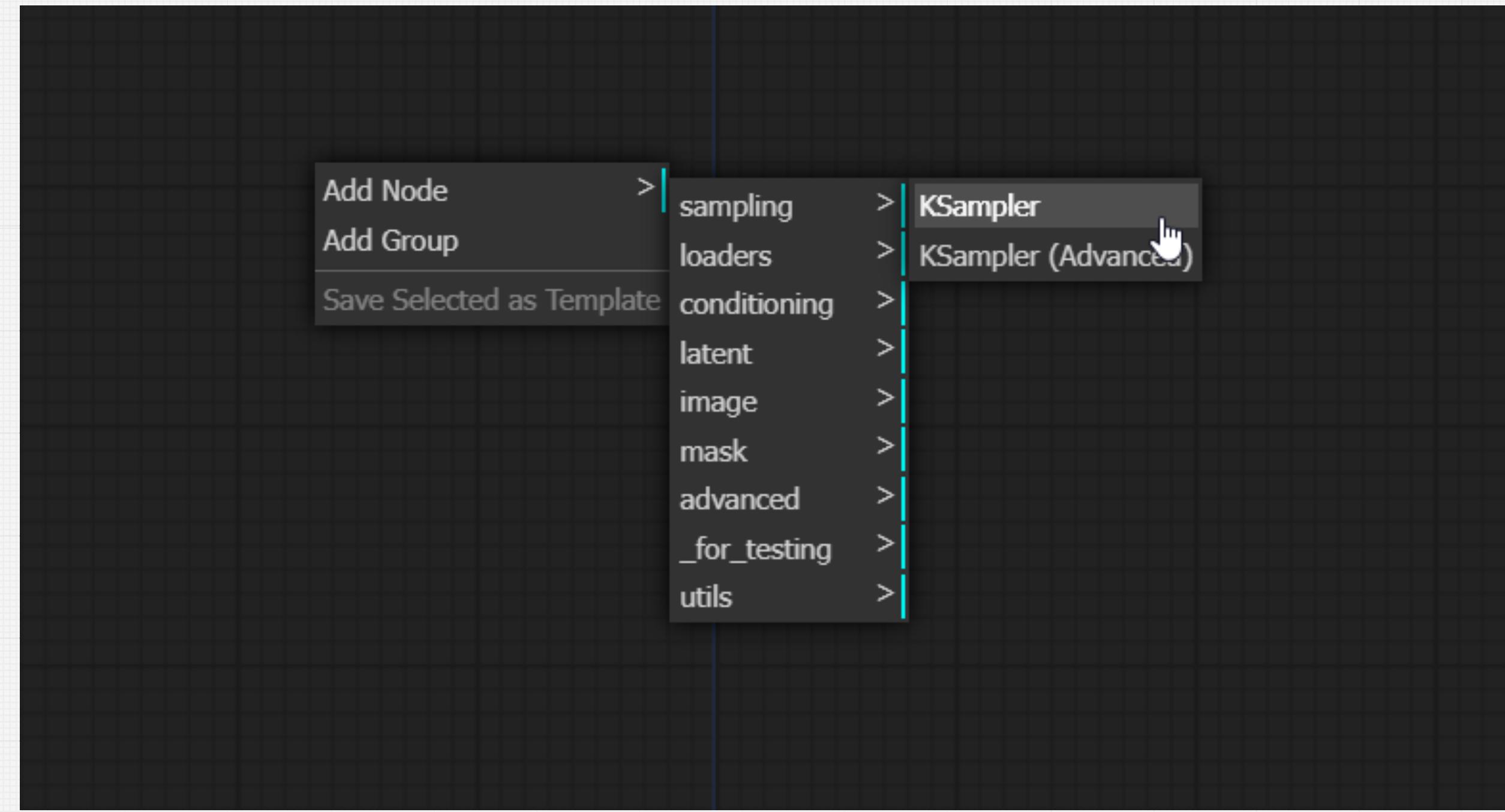
1. Quick-Install (Windows, NVIDIA)
2. Clone from Github (Windows, Linux)
3. Clone from Github (Mac)

Note: All the links and guides will be shared in the chat

ComfyUI User Interface

Nodes

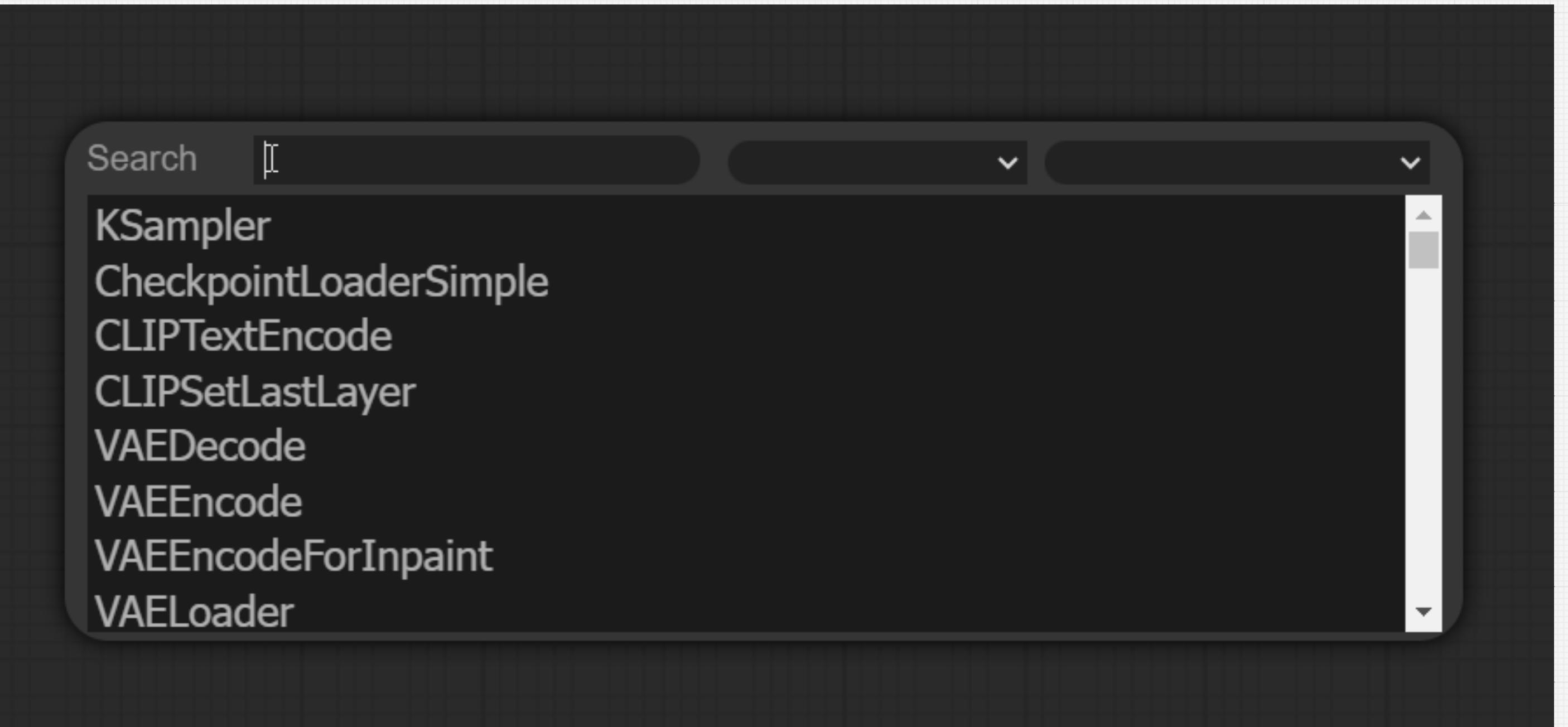
You can add a node by right clicking on blank space -> Add Node.



ComfyUI User Interface

Nodes

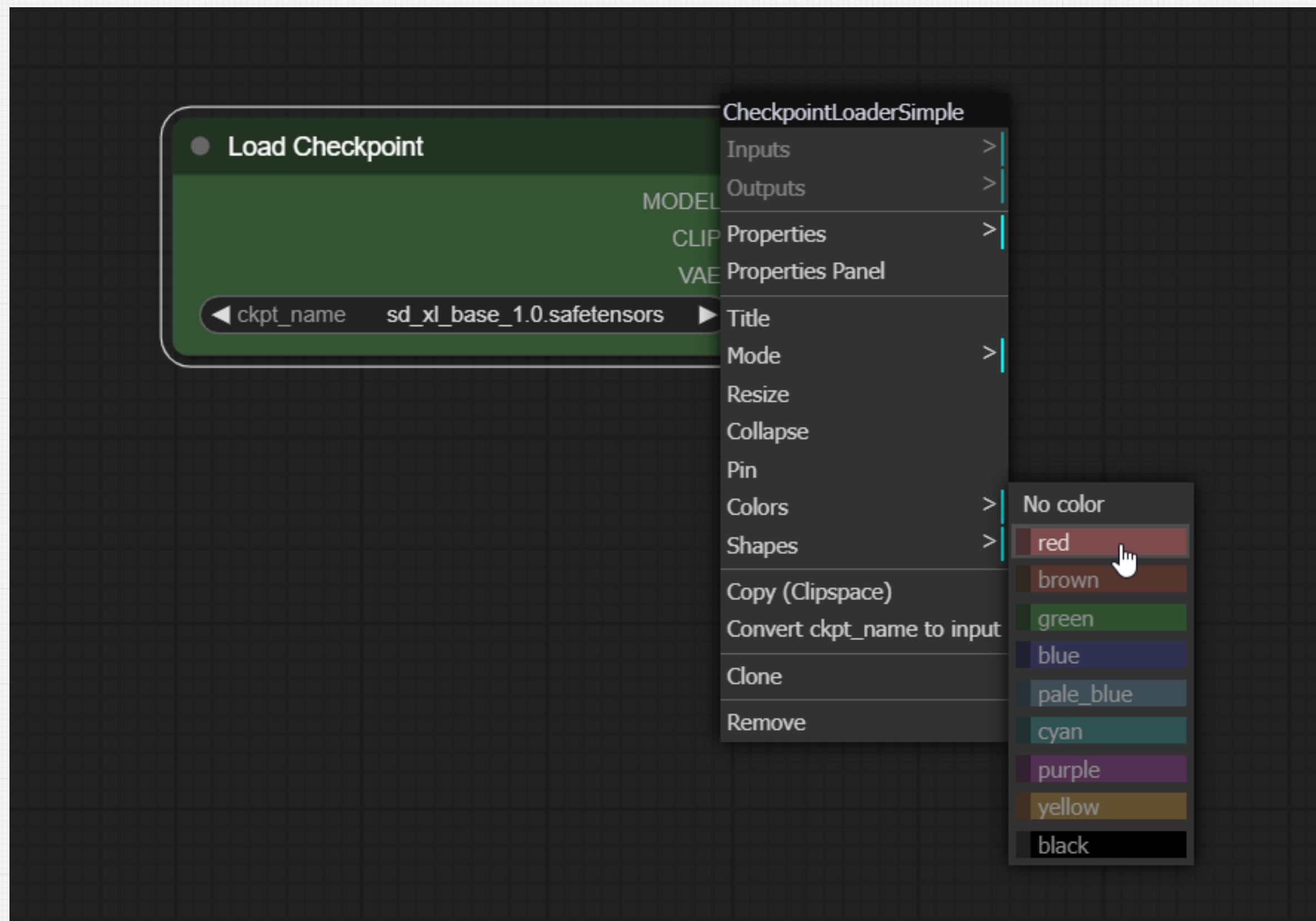
*double click on blank space to get
the list of all nodes and a searchbar*



ComfyUI User Interface

Nodes

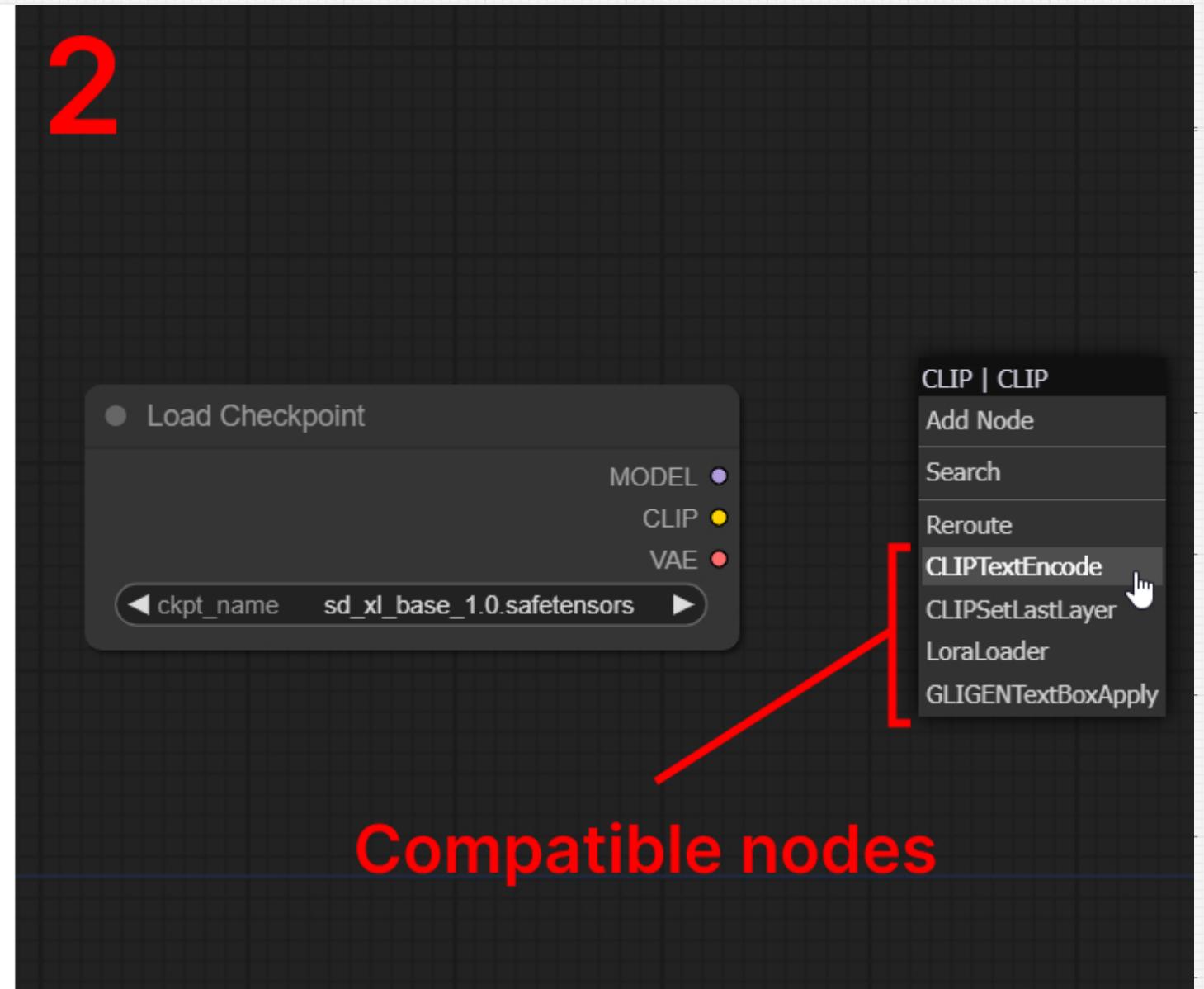
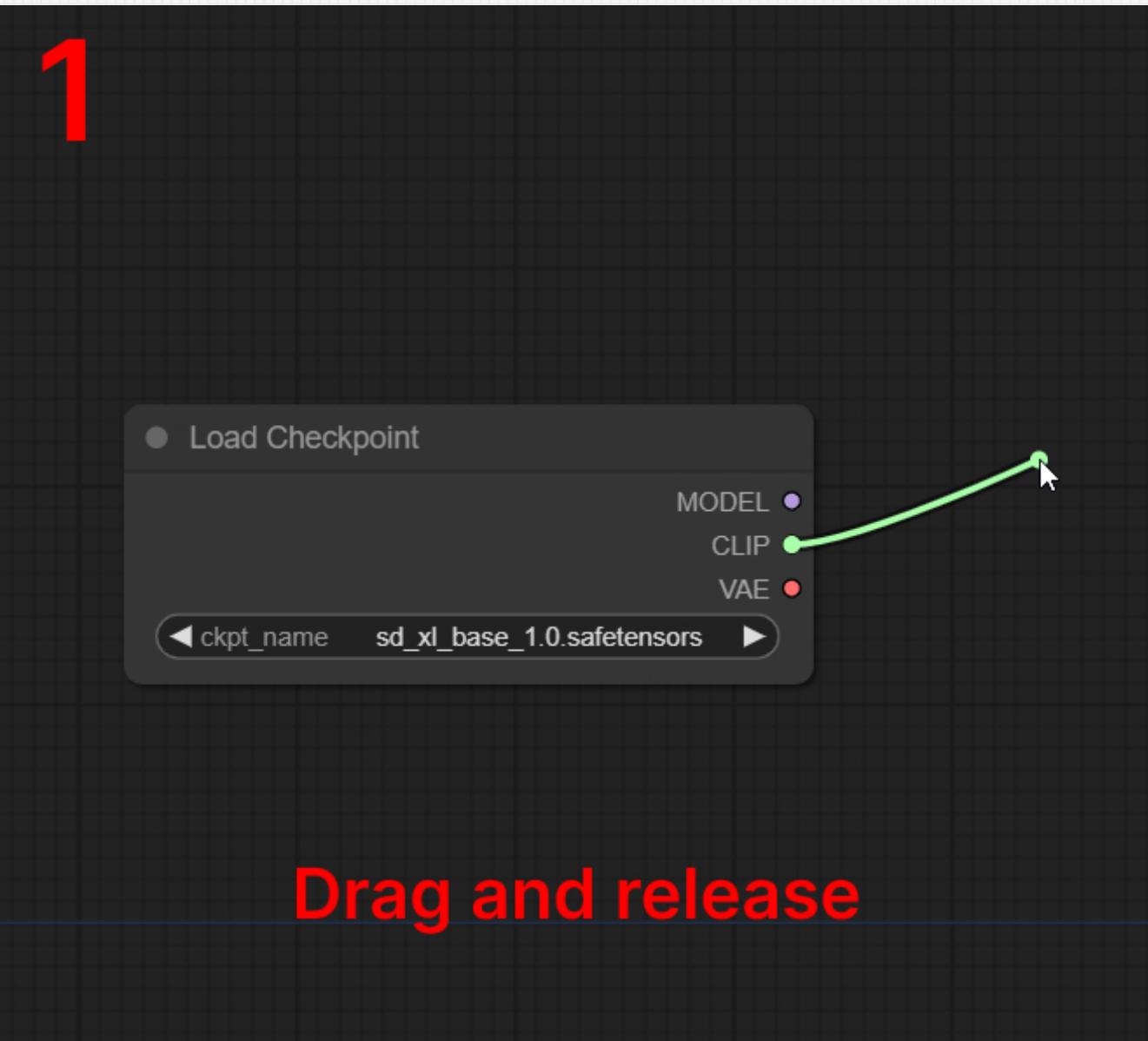
*change the color of nodes to help you stay organized.
Right click -> Color -> select color*



ComfyUI User Interface

Connecting Nodes

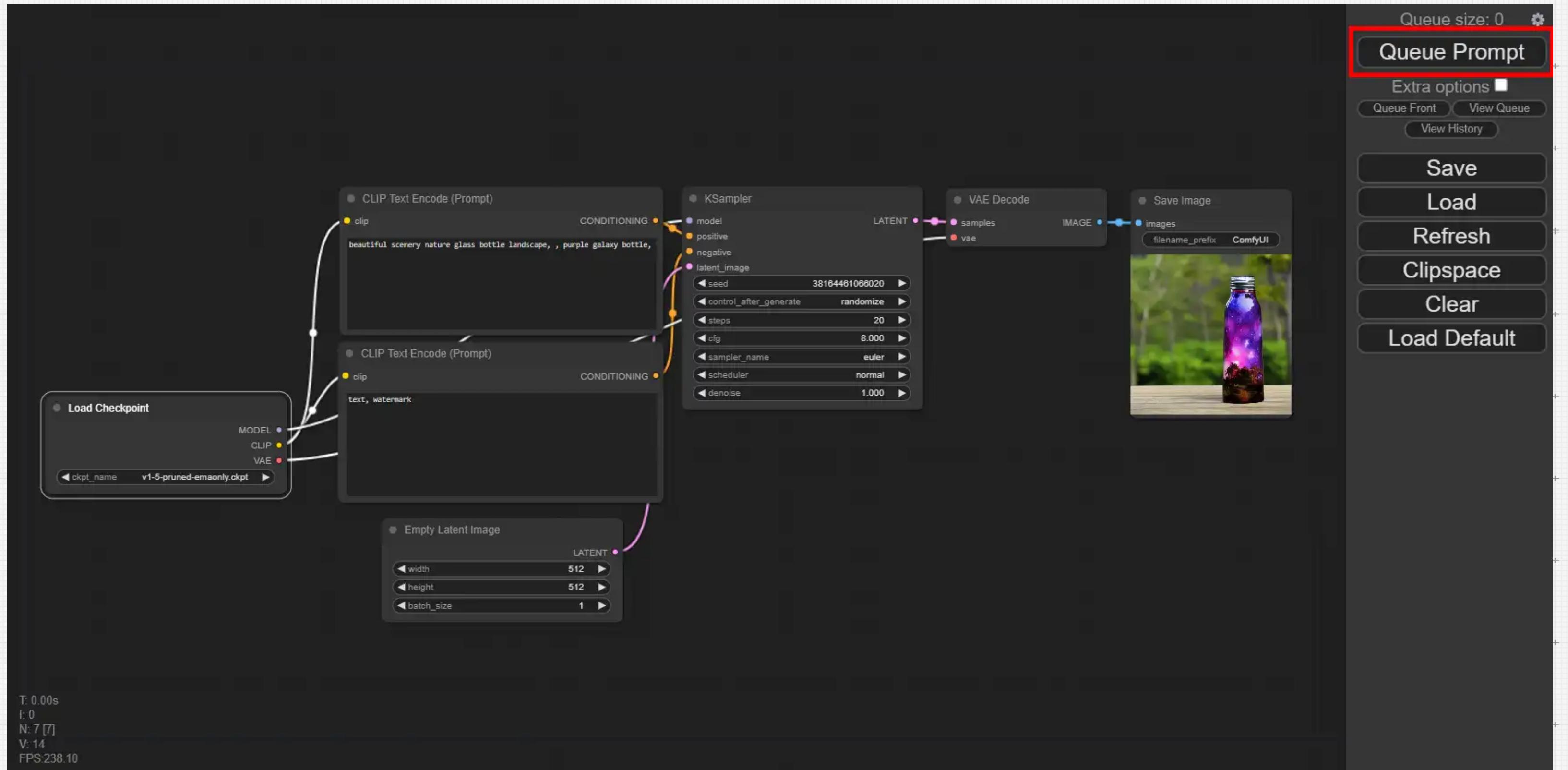
drag and release an input into blank space, you will get a list of compatible nodes:



ComfyUI User Interface

Execution

When you click Queue Prompt, the workflow passes through the nodes in the order they're connected, starting from Loaders, which have no inputs, only outputs.



ComfyUI Nodes **Explained**

**How do we understand what's actually
going on so that we can create and modify
workflows?**

To understand nodes, we have to understand a
bit about how Stable Diffusion works.

Load Checkpoint Node

The .safetensors or .ckpt checkpoint models you use to generate images have 3 main components:

1. CLIP model:

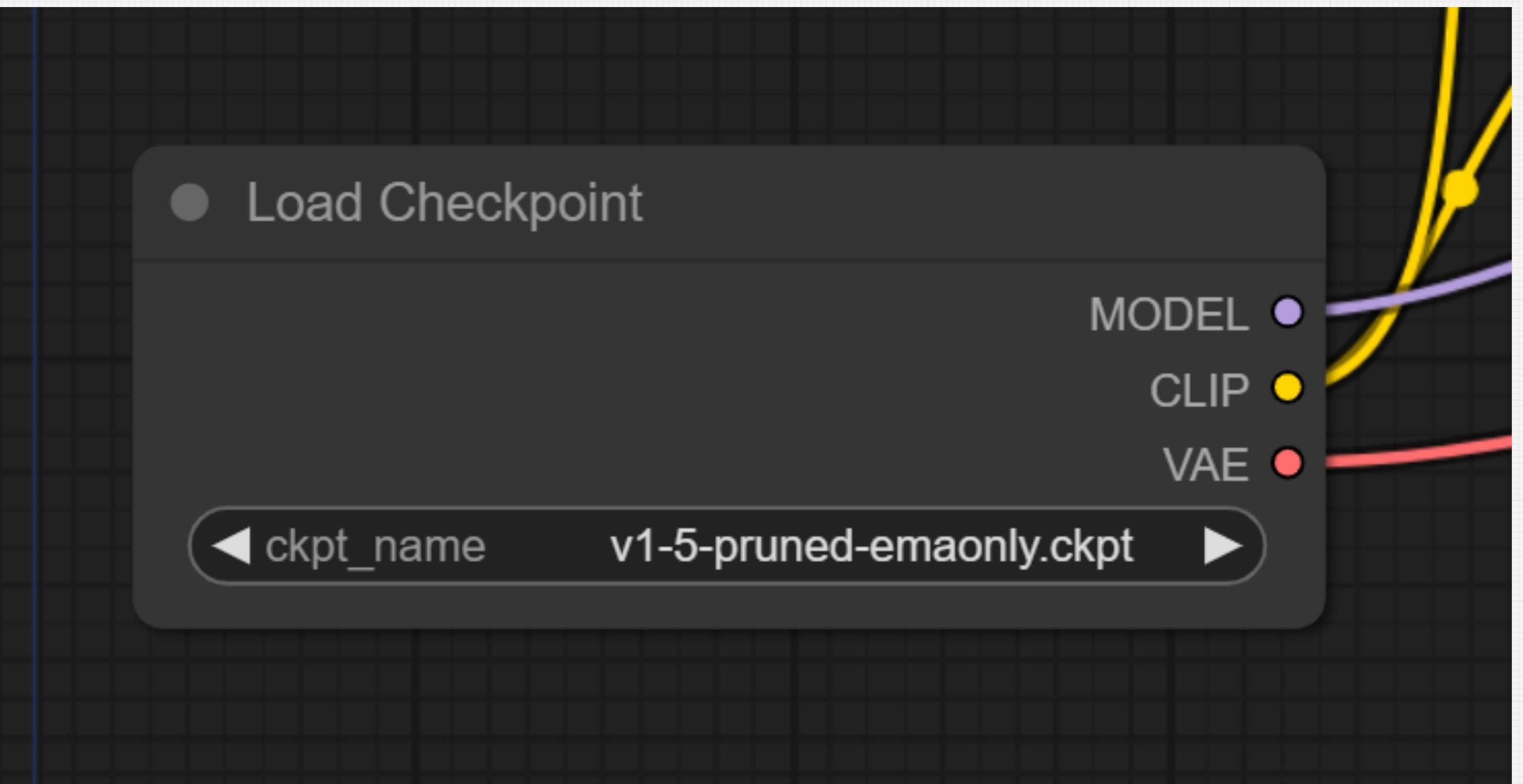
to convert text into a format the Unet can understand

2. Unet

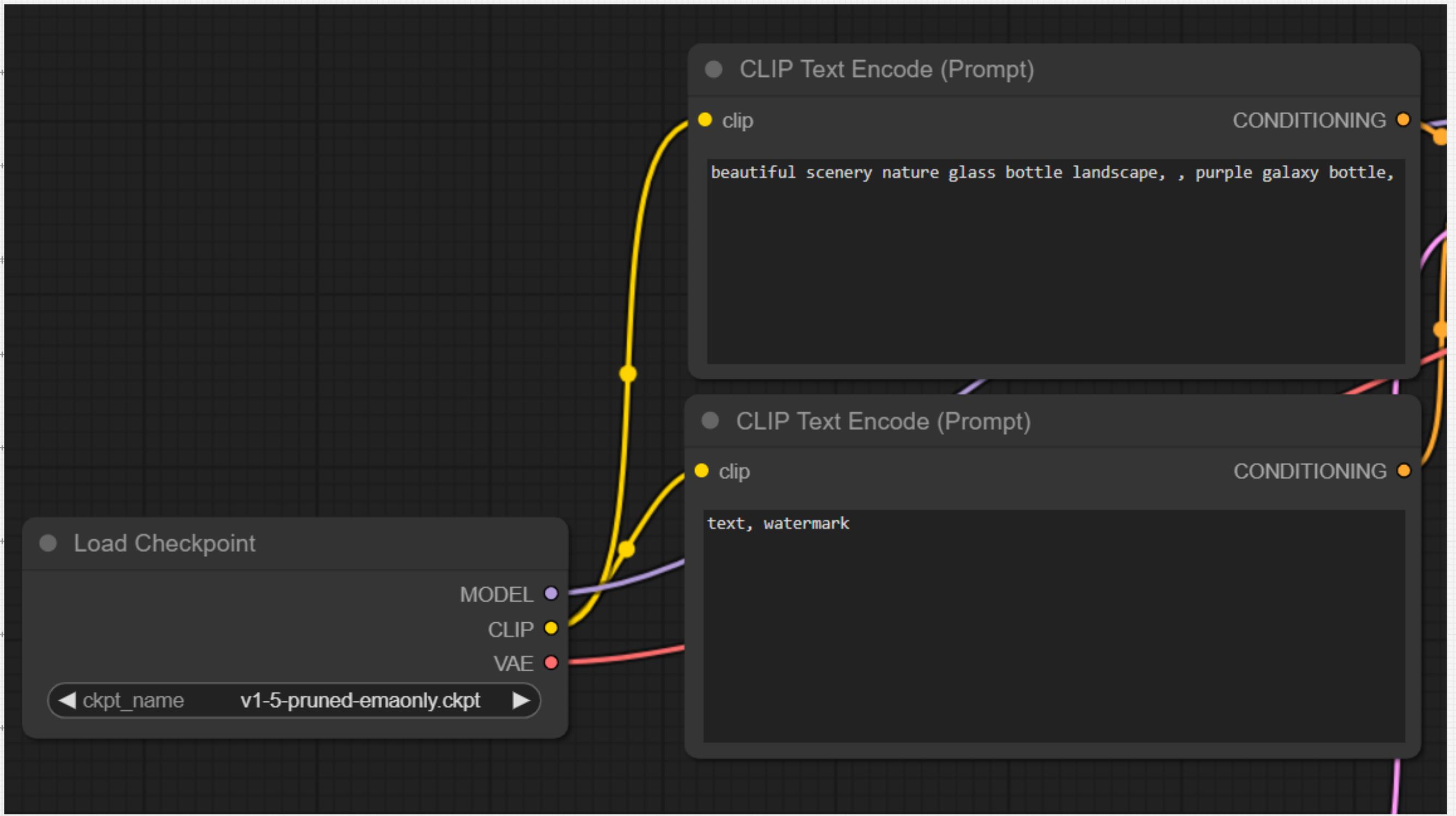
to perform the "diffusion" process, the step-by-step processing of images that we call generation

3. VAE

to decode the image from latent space into pixel space



CLIP Text Encode Node

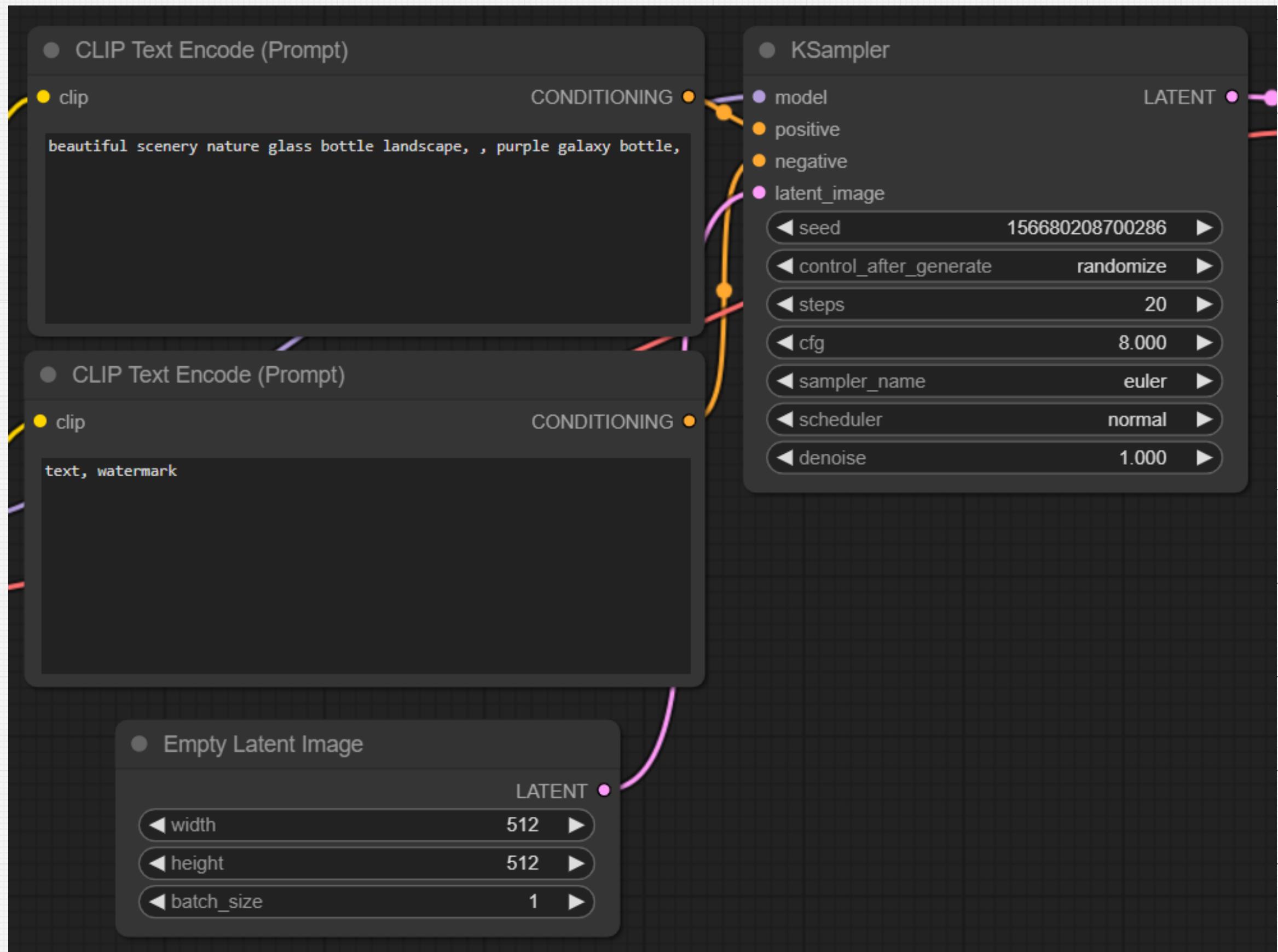


The CLIP model is used to convert text into a format that the Unet can understand (a numeric representation of the text). We call these embeddings.

KSampler

In Stable Diffusion images are generated by a process called **sampling**.

In ComfyUI this process takes place in the **KSampler** node.



KSampler

The KSampler takes the following inputs:

- **model**: MODEL output (Unet) from Load Checkpoint node
- **positive**: the positive prompt encoded by the CLIP model (CLIP Text Encode node)
- **negative**: the negative prompt encoded by the CLIP model (other CLIP Text Encode node)
- **latent_image**: an image in latent space (Empty Latent Image node)

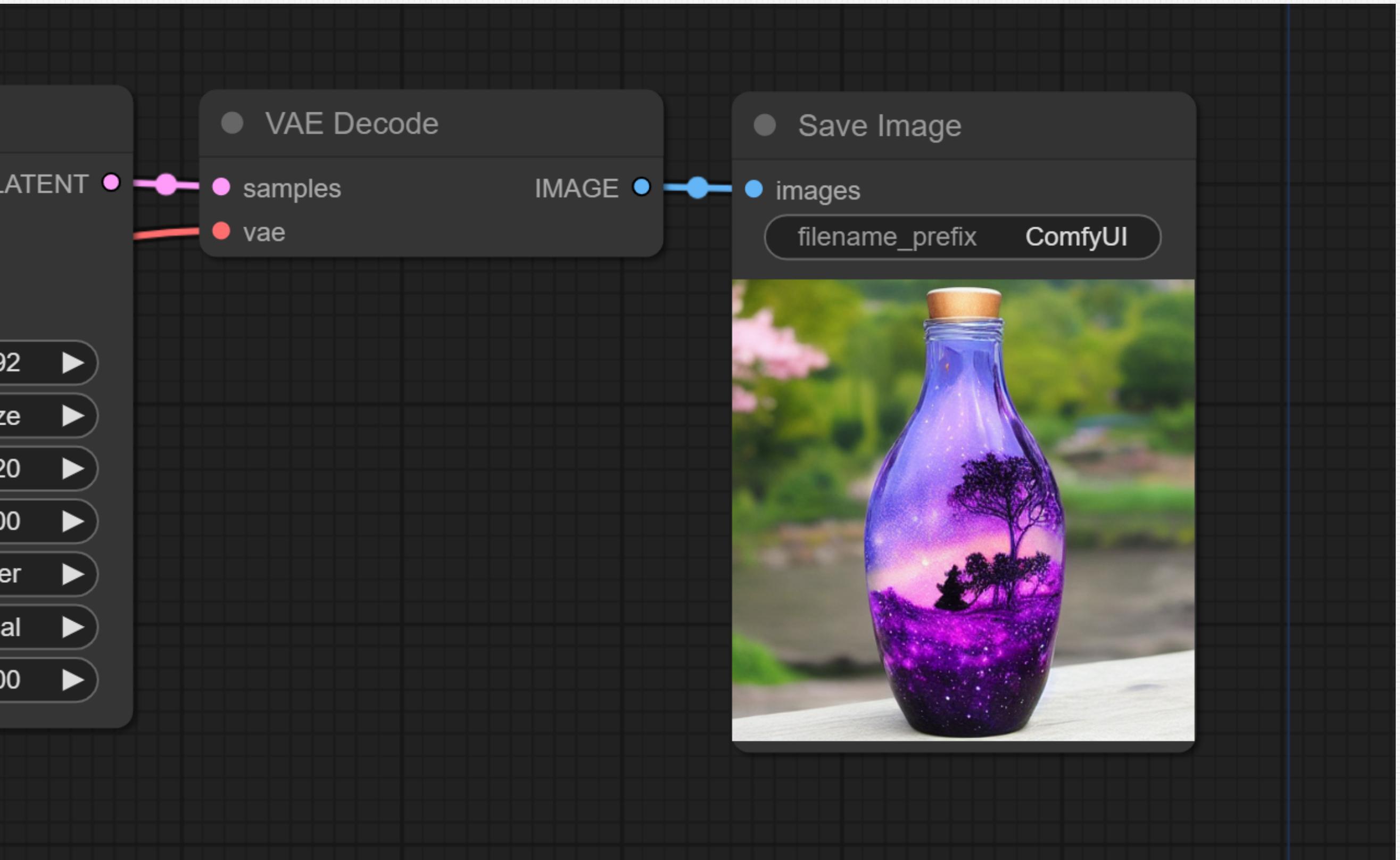
What's going on in the **KSampler**

1. Diffusion is the process that actually generates the images.
2. We start with a random information array and the embeddings (encoded positive and negative prompts).
3. Diffusion happens in multiple steps, each step operates on a the information array (also called latents), and produces another information array that better resembles the prompt text.
4. So we start with a random information array, and end up with one that resembles something we know.
5. The **KSampler** outputs this information. However, it is not in pixel space just yet (we can't see it), it's still a latent representation.

VAE

The **VAE Decode** node takes 2 inputs:

- The VAE that came with our checkpoint model (you can also add your own VAE)
- The latent space image that our **KSampler** has finished denoising.



Downloading Models

For running SDXL, it's likely that you'll want a couple of other models as well.

Checkpoints

[SDXL 1.0 base checkpoint](#)

[SDXL 1.0 refiner checkpoint](#)

VAE

[Fixed SDXL 0.9 VAE](#)

LoRAs

[SDXL Offset Noise LoRA](#)

Upscaler

[4x_NMKD-Siax_200k.pth upscaler](#)

[4x-Ultrasharp.pth upscaler](#)

Note: All the links and guides will be shared in the chat

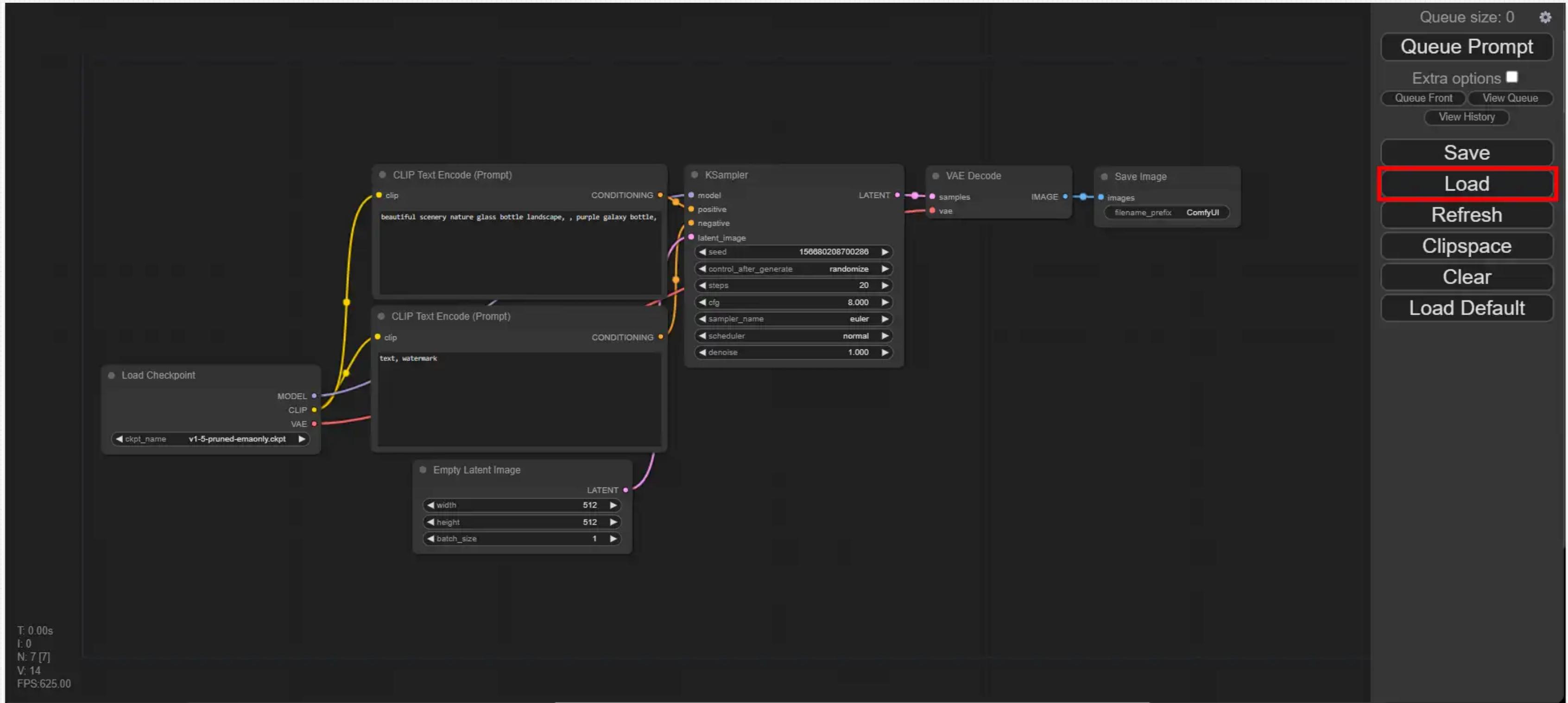
Share models between another UI and ComfyUI

Let's say you have another UI such as AUTOMATIC1111 installed. You don't want to take up extra hard drive space by copying all of your checkpoint models into both the AUTOMATIC1111 folder and the ComfyUI folder.

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Recommended Workflows

One of the best parts about ComfyUI is how easy it is to download and swap between workflows.



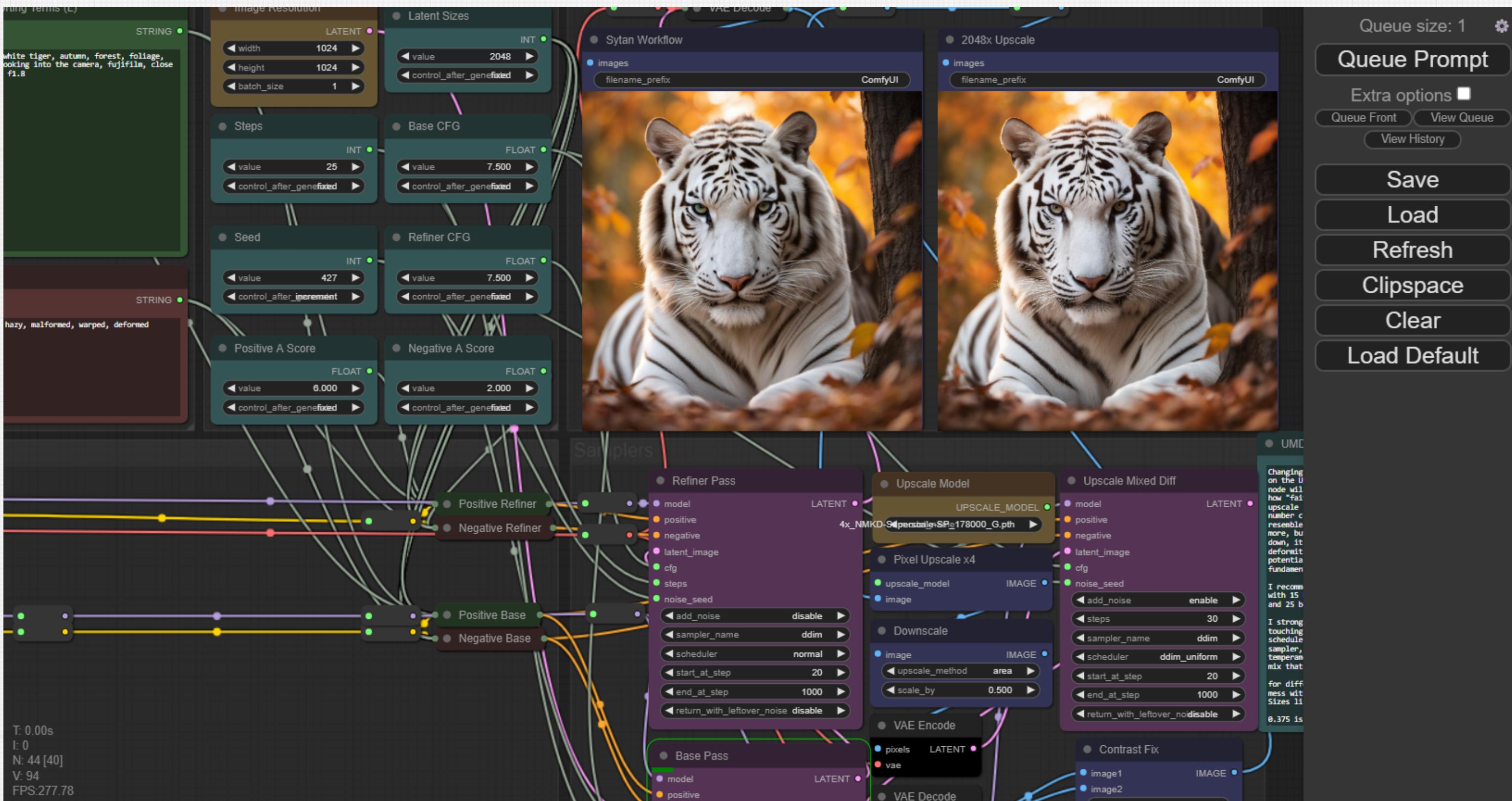
To load a workflow,
simply click
the Load button on the
right sidebar, and select
the workflow .json file.

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Some Popular Workflows

Sytan's SDXL Workflow

One of the most popular workflows for SDXL. Features upscaling.

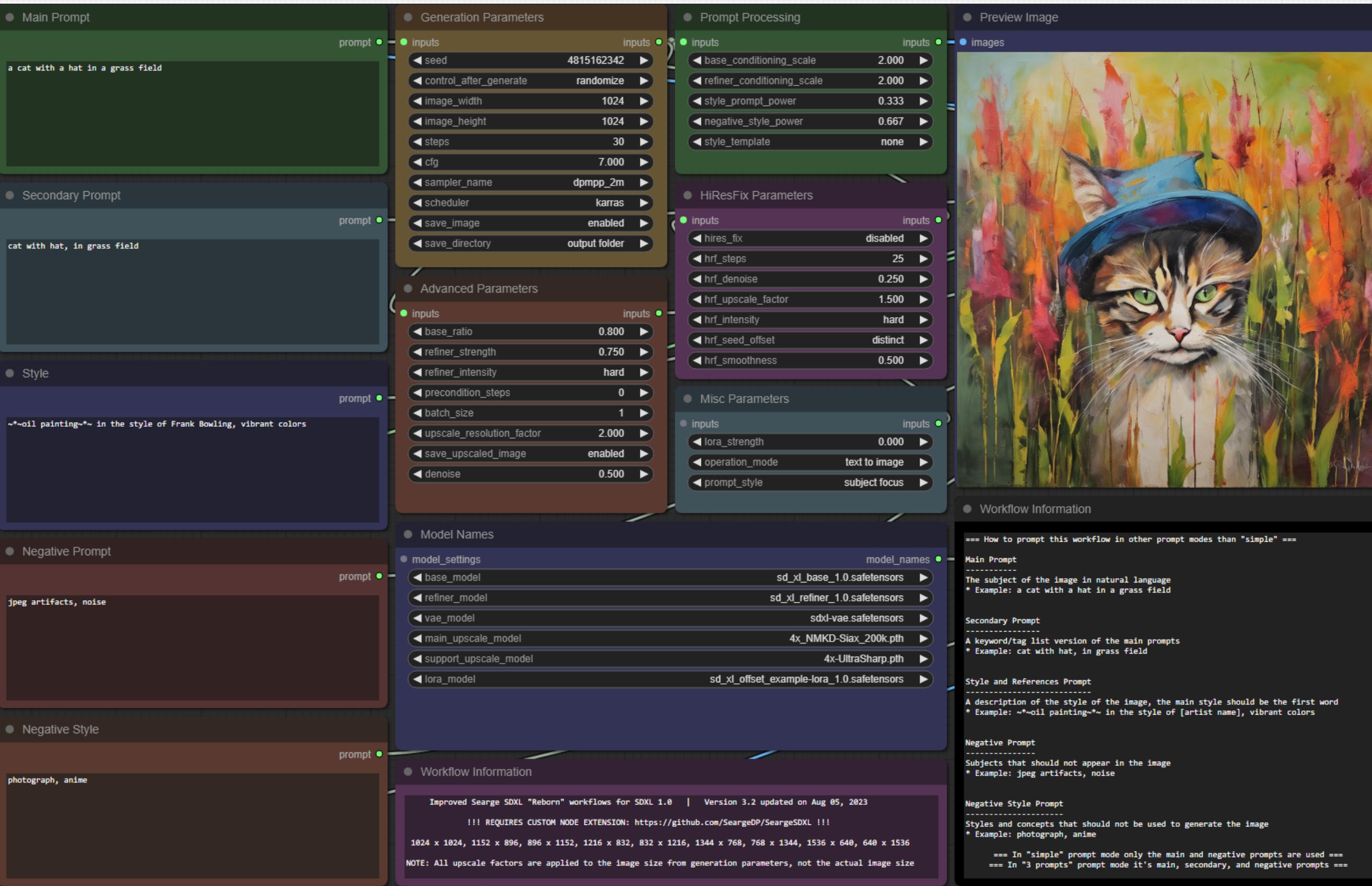


Note: Link to documentation shared on chat

Some Popular Workflows

Sarge SDXL Workflow

Has 3 operating modes (text-to-image, image-to-image, and inpainting) that are all available from the same workflow and can be switched with an option.



QnA