# Bonsai 2.0

Getting Started

## INSTALL GUIDE

BONSAI 2.0 is designed to work with the Windows operating system through the .NET framework. The recommended environment is Windows 7 or Windows 8/8.1. Windows XP is no longer supported. The easiest way to get started with BONSAI is by using the installer which you can download at: https://bitbucket.org/horizongir/bonsai/downloads

The installer will make sure any required software dependencies for running BONSAI are correctly setup in your computer.

## PACKAGE MANAGER

BONSAI is a modular framework, which means you can extend its functionality by installing software packages containing modules designed for specific purposes. BONSAI provides a NuGet package manager client that allows you to browse available packages on either the NuGet gallery (https://www.nuget.org/) if you have Visual Studio installed, or the official BONSAI curated feed at myget.org.

When you first run BONSAI, any required packages will be automatically downloaded and the package manager will be launched so you can customize your installation:
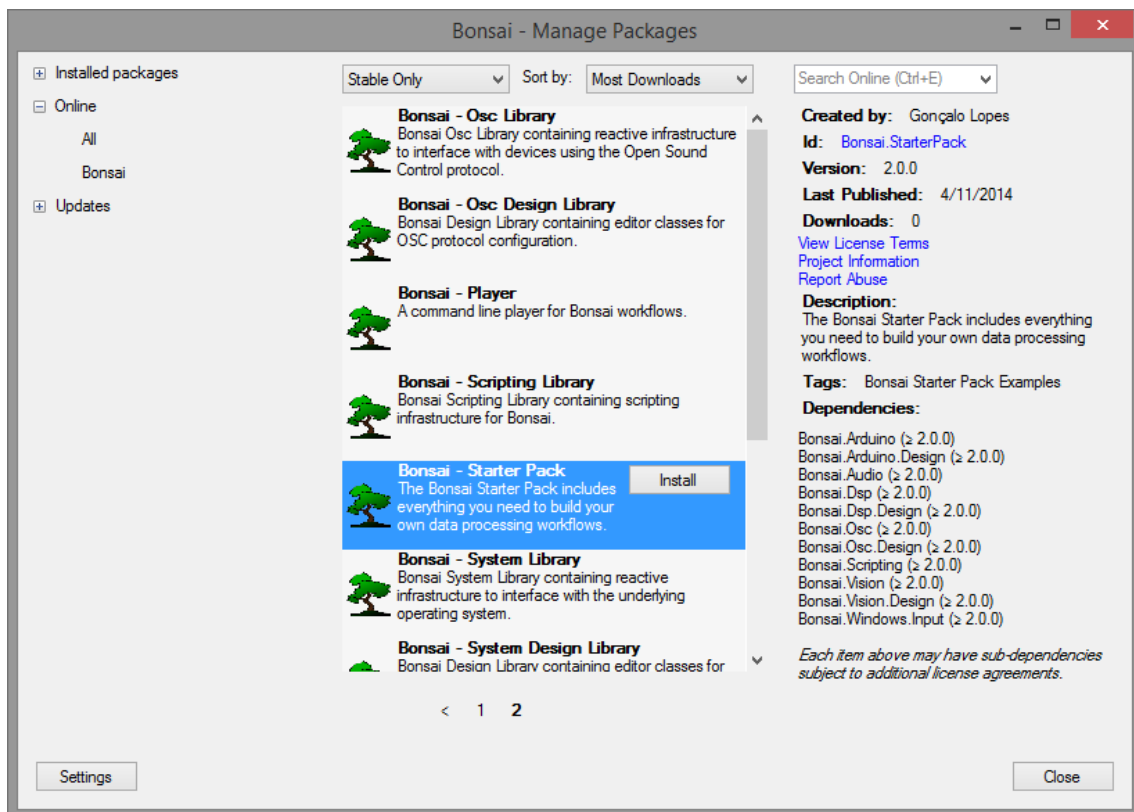


*Fig. 1: The BONSAI package manager dialog. Selected packages that are not currently installed have an "Install" button displayed on the right.*

Packages that are already installed are displayed with a green tick mark to the right of the title. You can install new packages by selecting a package title or description and then clicking on the "Install" button that appears to the right. You can search for new packages using the text box in the upper-right corner.

***If you want to start playing with Bonsai right away you should download the Starter Pack package which will install all the major dependencies and includes prebuilt workflow examples.***

In the "Installed packages" tab you can browse the packages you currently have installed and optionally uninstall them. Similarly, the "Updates" tab will show you which of the packages you have currently installed can be updated to a newer version.

The "Settings" button will open a new dialog where you can make changes to some of the package manager options. It is currently possible to add new local or online package repositories to consume packages from or enable and disable existing package sources.

You can click the "Close" button or hit the Escape key when you are done managing your packages.

## WORKFLOW EDITOR

When BONSAI starts you will be taken directly to the workflow editor. This is where you can create, edit and run BONSAI workflows. It is composed by three main panels, illustrated below:
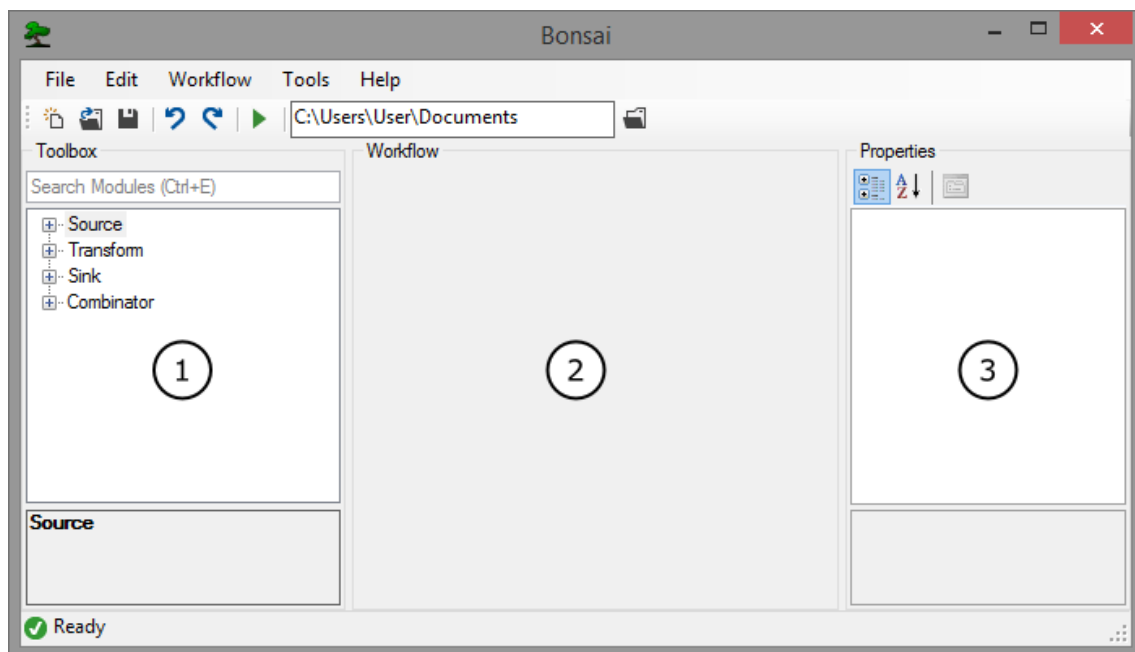


*Fig. 2: The BONSAI workflow editor with numbered bullets over the Toolbox, Workflow and Properties panels, respectively.*

## 1. Toolbox

In the toolbox you can search for available BONSAI modules to place in the workflow. There are four main module categories listed in the toolbox:

- **Sources** are usually at the start of every BONSAI workflow. They give rise to events and can provide access to data from multiple devices (sound card, cameras, ADCs, etc).

- **Transforms** are operators which take each data element coming in through the input and convert them into a new form. Some examples would be multiplying two numbers together, converting between image color spaces or applying a threshold to a digital signal.

- **Sinks** introduce side effects in the workflow processing without modifying the incoming data. Some examples of this would be writing data to a file, turning an electronic motor, or playing a sound.

- **Combinators** represent operators to manage the control flow and otherwise provide advanced functionality which is outside any of the above categories. Useful combinators allow you to manage the timing of events or correlate parallel input streams.

There are several ways to insert nodes from the toolbox into the workflow, depending on which node type you are creating. You can check available options by right-clicking on a toolbox entry, which will display the context menu shown below:
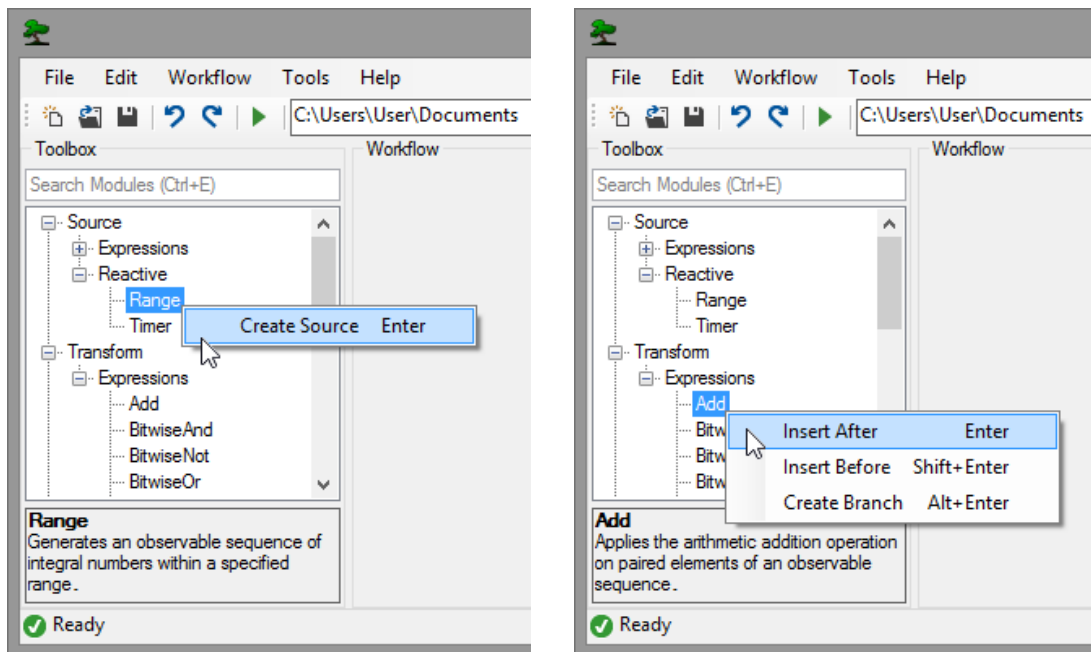


*Fig. 3: The BONSAI toolbox context menu that is displayed when right-clicking on either a Source or a Transform module, respectively.*

## 2. Workflow

The Workflow panel is where you compose the different modules to create data processing pipelines or other asynchronous computations. Each module is represented by a circular node. The output of one node can be directed as an input to another node by connecting the two nodes.

There a number of manipulations available to build your workflow, including branching, merging and grouping nodes in order to create complex data processing pipelines. All of these can be accessed via the context menu, which is displayed by right-clicking on the main workflow canvas.
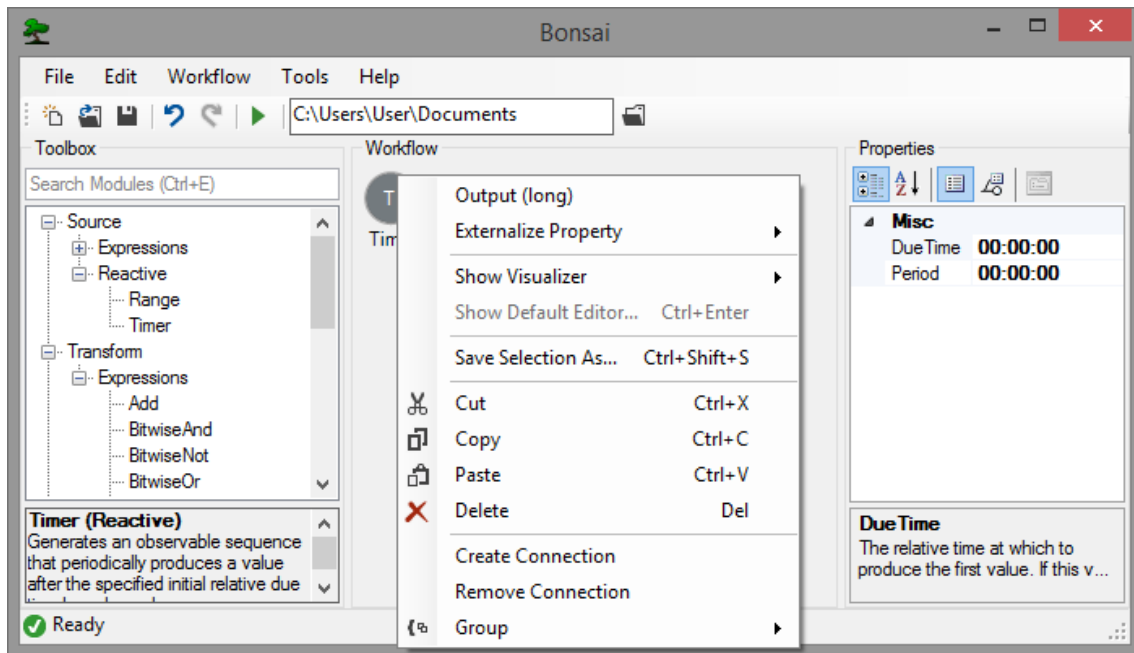
*Fig. 4: The BONSAI workflow context menu that is displayed when right-clicking on a node in the workflow editor canvas.*

## 3. Properties

Each BONSAI module can have its own distinct set of configuration properties that specify how the processing is to be performed (e.g. the Timer module exposes the period of the timer as a property, whereas a Threshold on images can expose the brightness cutoff value).