XBaya is a graphical client program for composing, launching, and monitoring workflows. XBaya is designed to be easy and intuitive to use for domain scientists. The graphical representation of workflows that XBaya uses is abstract and neutral to workflow languages so that users do not need to understand a specific workflow language to compose workflows. Instead, scientists can focus on their own research. Because of this abstract design, the graphical representation of workflows can be translated into various workflow languages, including BPEL.

One of the major design goals is interoperability. To make the various parts of the system interoperate with other Web services-aware tools, XBaya uses Web services standards everywhere in the system. The components of workflows are described in WSDL, which makes it possible for users to orchestrate Web services created by various tools into workflows. A composed workflow itself becomes another Web service, which can be invoked by a standard Web services tool or be a part of a higher-level workflows. Since the mail workflow language that XBaya users is BPEL, composed workflows can be executed on various BPEL engine implementations.

**Workflow composition**

![Figure 1: A screenshot of XBaya composing a workflow](image)

XBaya provides an easy-to-use graphical interface to orchestrate Web services into workflows. Figure 1 is a screenshot of XBaya composing a workflow. The main part of the window is a workflow canvas where a workflow is composed. The left upper part shows a list of components that can be used to compose workflows. Users can add more components by specifying the location where WSDL documents are stored. WSDL documents can be harvested from various sources, such as local file systems, web pages, or multiple types of service registries such as XRegistry. In addition to Web service components, several system components are listed in the component list. System components
include Input/Output components, which specify Input/Output parameters of a workflow, and several structural components, such as If and ForEach. The left bottom part shows the information of the component that is selected. The right bottom part shows the information of input and output parameters that are selected.

To compose a workflow, users can simply drag and drop components they want to use from the component list to the workflow canvas and connect the input/output parameters of each component to the output/input parameters of other components. When two parameters get connected, the validity of the connection is checked. If the types of two parameters are not compatible, XBaya warns users about the mis-connection.

There are a couple of important system components, which are input components and output components. They are used to specify the input parameters and output parameters of a workflow. The type of workflow input/output parameter is extracted from the input/output parameter of the Web service component connected to the input/output component. When a workflow is composed, each input parameter of all components has to be connected either to an output parameter of other Web service component or to an input component. On the other hand, output parameters do not need to be connected to any parameters. If there are some unconnected output parameters, the output values are simply ignored during the workflow execution.

**Workflow monitoring**

![Workflow monitoring](image)

Figure 2: A screenshot of XBaya monitoring a workflow execution. As the workflow progress, each component changes its color, indicating the status. When a Web service is invoked, the corresponding box changes the color from its original color, orange, to green. When the Web service finishes successfully, the color changes to gray. If the Web service fails, the color changes to red. In the figure, Adder_add is gray, indicating that the Adder_add service has been invoked and finished successfully. Adder_add_2 is green, indicating that the Adder_add_2 service has been invoked and is currently
running. Multiplier_multiply is orange, indicating that the Multiplier_multiply service has not been
invoked yet. The list of notification messages received are shown at the bottom of the window. The
detail of each message can be shown in a pop-up window by double-clicking the message. Users can
also move the slider at the bottom to see how the workflow has progressed.

**Configuration**

XBaya takes the following configuration parameters, which are typically set by the portal.

**GPEL related options:**

- `-gpelEngineURL url`
  Specify the location of GPEL engine to use.
- `-gpelTemplateID templateID`
  Specify a workflow template by its ID. This workflow template will be loaded to XBaya
  automatically. This option is used when a user wants to modify an existing workflow template.
- `-gpelInstanceID instanceID`
  Specify a workflow instance by its ID. This workflow instance will be loaded to XBaya
  automatically. This option is used when a user wants to monitor the execution of a workflow
  instance.

**Registry related options:**

- `-xRegistryURL url`
  Specify the location of XRegistry. XBaya loads the list of components from XRegistry
  automatically.
- `-resourceCatalogURL url`
  Specify the location of resource catalog. XBaya loads the list of components from Resource
  Catalog automatically. Resource catalog is being obsoleted.
- `-gfacRegistryURL url`
  Specify the location of GFac Registry. XBaya loads the list of components from GFac Registry
  automatically. GFac Registry is obsolete now.
- `-localRegistry dir`
  Specify the local directory path, from where the list of WSDL documents are read. This option is
  used only when a user launches XBaya locally.

**myLEAD related options:**

- `-myLeadAgentURL url`
  Specify the location of myLEAD agent. myLEAD agent is used to load and store workflows.
- `-myLeadUser userDN`
  Specify the DN of the user.
- `-myLeadProject projectID`
  Specify the ID of the project that a user uses.
- `-myLeadSampleUser userDN`
  Specify the DN of sample user. This sample user is used to store public workflows.
- `-myLeadSampleProject projectID`
  Specify the ID of the sample project. This project under the sample user is used to store public
  workflows.

**Monitoring related options:**

- `-brokerURL url`
  Specify the location of the notification broker to use.
- `-topic topic`
Specify the topic to subscribe. The topic is usually set to the ID of an experiment by the portal.

- **pullMode {true,false}**
  Specify if the pull mode is used to circumvent firewalls. When the pull mode is set, the URL of the message box needs to be specified.

- **messageBoxURL url**
  Specify the location of message box to use.

- **startMonitor {true,false}**
  Specify if XBaya starts monitoring automatically. This option is set true to make XBaya start in the monitoring mode.

- **karmaURL url**
  Specify the location of Karma, which is used to load past notification messages.

- **karmaWorkflowInstanceID**
  Specify the ID of a workflow instance to load past notification messages of

**Security options:**

- **-myProxyServer host**
  Specify the host name of the myProxy server to use.

- **-myProxyPort port**
  Specify the port number of the myProxy server to use.

- **-myProxyUsername username**
  Specify the username of the user used to load a proxy credential.

- **-myProxyLifetime sec**
  Specify the default proxy life time.

- **-loadMyProxy {true,false}**
  Specify if XBaya loads a proxy credential at the startup. When this option is set true, XBaya pops up a dialog box where a user type the passphrase.

**Workflow invocation related options:**

- **-gfacURL url**
  Specify the default location of GFac to use. This location will be set to the LEAD context header when XBaya invokes a workflow.

- **-dscURL url**
  Specify the default location of DSC to use. This location will be set to the LEAD context header when XBaya invokes a workflow.

**GUI related options:**

- **-title title**
  Set the title shown on the title bar.

- **-width width**
  Set the width of the frame.

- **-height height**
  Set the height of the frame.

**Other options:**

- **-help**
  Shows the list of options.

- **-workflow workflow**
  Specify the filename of a workflow, which XBaya loads automatically.