# User Guide

# StMPI

Version 1.0, December 2019

# 1.0 Introduction

Message Passing Interface (MPI) was a standardized means of exchanging messages between multiple computers running a parallel program across distributed memory. MPI 1.0 was officially released in the June 1994. Since then, many organization comes out with their MPI implementation such as Open MPI, Intel MPI, MPICH2, MSMPI and etc. Most of this implementation are bind to some compiler to support a certain programming language.

In this work, we present a MPI implementation for Smalltalk programming language. Smalltalk MPI (StMPI) was a framework that's allow Smalltalk user to access the MPI library from the Smalltalk IDE. StMPI was developed by binding the Smalltalk with C MPI library. StMPI was build to work in both Windows and Linux.

# 2.0 Requirement

You need to have the following software install in your machine for the StMPI to work properly:

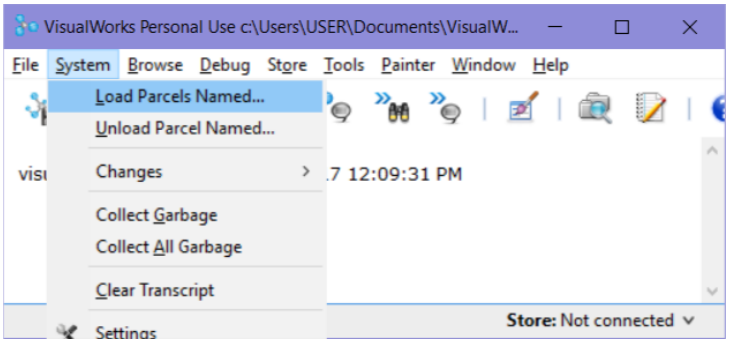
- A working MPI implementation. MPICH2 or any derivation of its.
- Cincom VisualWorks. Any version that support DLL and C Connect framework.

# 3.0 Installation

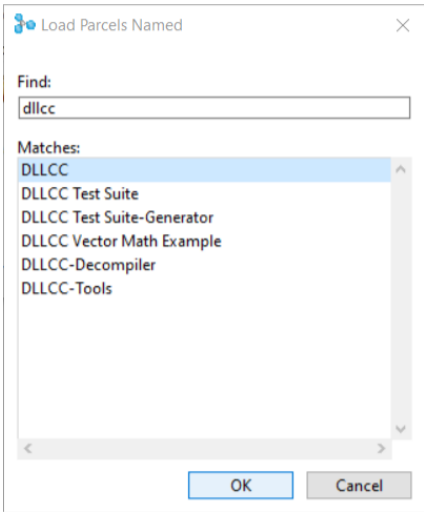
After all the requirement are meet, we are ready for the installation.

### *3.1 Load DLL and C Connect (DLLCC) parcel*

- Open your Smalltalk project.
- Go to System → Load Parcels Named

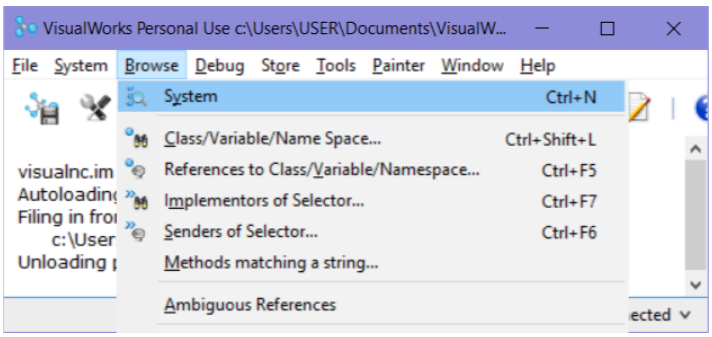



- Find DLLCC and click Ok.

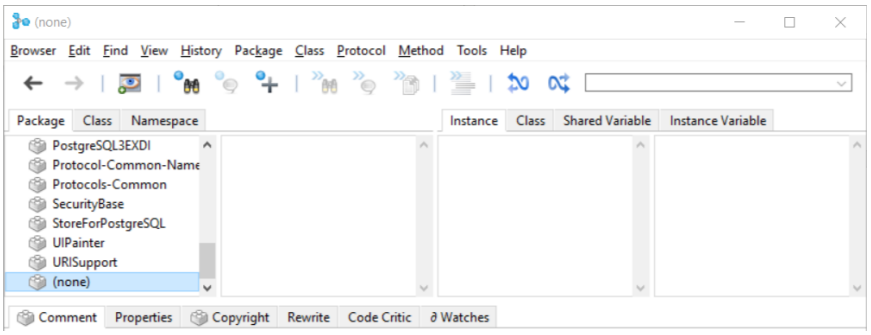


### *3.2 Load StMPI.st into your project*

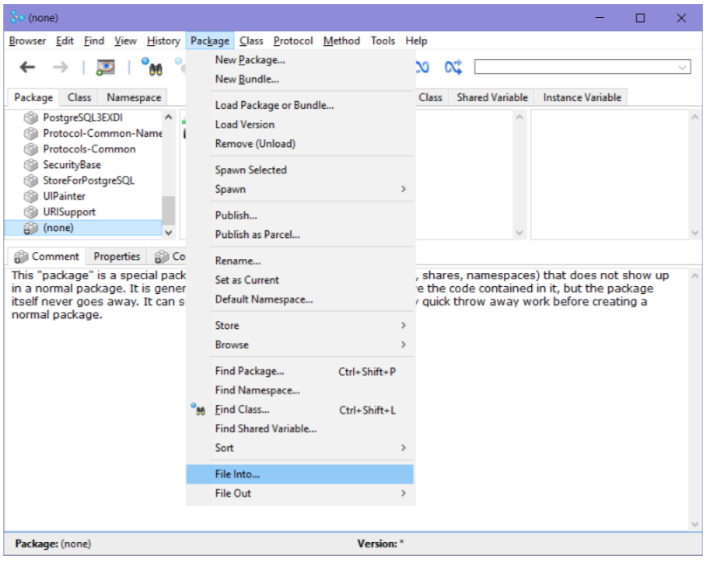
- Go to Browse → System




- Under package tab, find (none) and click on it.



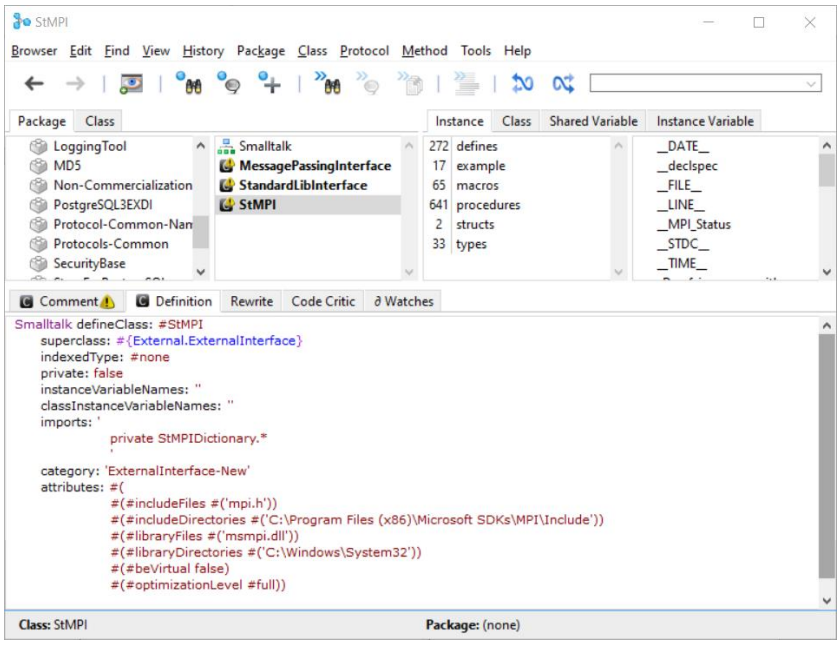

- Go to Package → File Into




- Select StMPI.st from the installation folder

### 3.3 *Configure MPI header and library*

- From the Smalltalk browser, go to StMPI Defination tab




- Change the includeDirectories to the directory of your mpi.h in your machine.
- Change the libraryFiles to be the same MPI library on your machine. The name of the file depend on what working MPI implementation you installed on machine. (‘msmpi.dll’ is for Microsoft MPI).
- Change the libraryDirectories to the location of your MPI library.

# 4.0 How to run it?

You need to run the image file from the command line to use StMPI just like others MPI implementation. The command to run the MPI is either **mpiexec** or **mpirun**. It depends on which MPI implementation you have on your machine. In general, this how you would run StMPI:

```
mpiexec -np 4 vwnt.exe ImageName.im
```

Command '-np 4' will run the image in parallel of 4 processor. You can adjust the number to suit your need. You need to add directories to vwnt.exe and *ImageName.im* if there are not in the same directories. Below is the example:

```
mpiexec -np 4 vwnt.exe "C:\Users \Documents\VisualWorks Projects \ImageName.im"
```

You can add the '**doit**' command at the end of the **ImageName.im**. The example is as follow:

```
mpiexec -np 4 vwnt.exe ImageName.im -doit "Class new FunctionName"
```

If you need to run multiple program, the command example is as follow:

```
mpiexec -np 4 vwnt.exe Image1.im : -np 2 vwnt.exe Image2.im
```

The above command will run in 6 processor. First four process is for Image1.im, process 5 and 6 are for Image2.im. You can use the above command to do parallel in Smalltalk and another programming language that support same version of MPI. You can see MPICH documentation for function calls. We have tested using StMPI for Smalltalk and MPICH2 for C++.

# 5.0 Example

We provide example for you to explore to get better understanding of StMPI. The example is the simple image processing application. This application can only run on Windows based system. The following is the step to execute the example in Windows.

- Make sure you have met the requirement in section 2.0 of this document.
- Open Simple Image Processing Application folder in the StMPI.zip that we provide to you.
- Open Run Application.bat file.
- You can open the README for your references.

That's it.