

Sequence Chart Studio

User Instructions

Version 0.3.0

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Basic Instructions

The SCStudio requires Microsoft Visio 2003 or higher. This document assumes you have already purchased and installed a copy of Microsoft Visio.

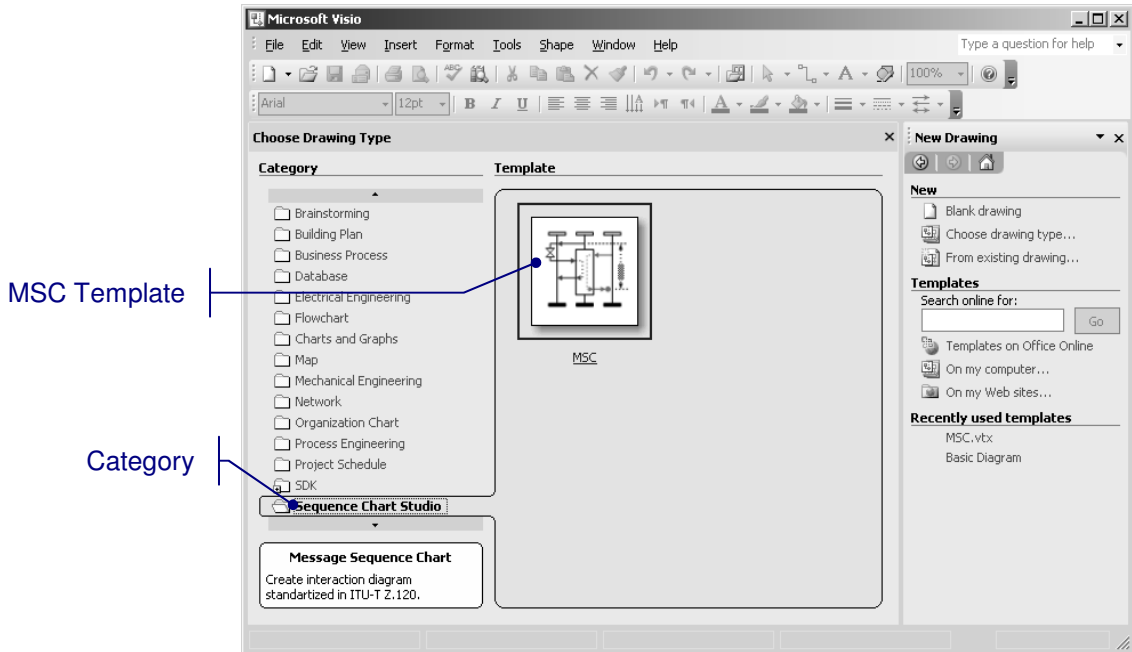
Download	The latest version of SCStudio can be freely downloaded from http://scstudio.sourceforge.net
Installation	Download and run the 'scstudio-setup.exe'. The setup application will guide you through the installation process.
Macro Security	<p>The installation application will ask you to import a new certificate. This is necessary to certify the installed macros.</p> <p>When executing Microsoft Visio, a security warning may appear. When it appears:</p> <ul style="list-style-type: none">– Verify the macros are published by Petr Gotthard;– Select "Always trust macros from this publisher";– Click "Enable Macros".
Operation	<p>The add-on will be automatically enabled when the MSC template is used, or when a MSC stencil is dropped to (any) document.</p> <p>Please note, the templates and stencils from other products (e.g. Sandrila) are not supported. Only files provided with the scstudio will work correctly.</p> <p>If you don't want to use the MSC template and/or MSC stencils,</p> <ul style="list-style-type: none">– Open or create your document;– Select menu Tools – Add-Ons – Run Add-On..., select "Sequence Chart Studio" and click OK.
User Support	<p>If you need help:</p> <ul style="list-style-type: none">– Join http://lists.sourceforge.net/mailman/listinfo/scstudio-devel;– Send an e-mail to scstudio-devel@lists.sourceforge.net. <p>Please note, to avoid SPAM (egg sausage and bacon), the list doesn't accept mails from non-members; you have to join the list.</p>

Graphics Editor

Introduction

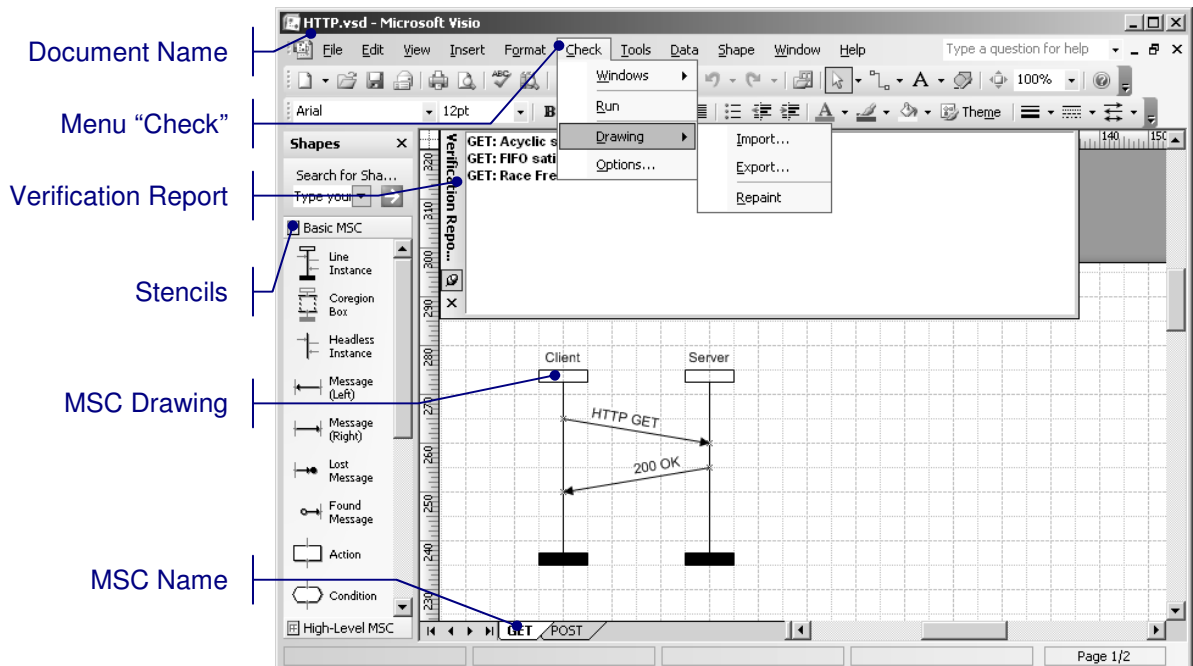
Selecting Template

After starting the Microsoft Visio, select the category "Sequence Chart Studio" and choose the MSC drawing template.



Graphical Editor

Drag and drop basic MSC or HMSC stencils to the drawing. Glue the shapes to each other.



Using Stencils

Every stencil provided with SCStudio represents a given MSC symbol regardless the actual shape of the stencil. You may thus freely change the format of any shape, or rotate the drawing.

Caution

This approach has also several pitfalls.

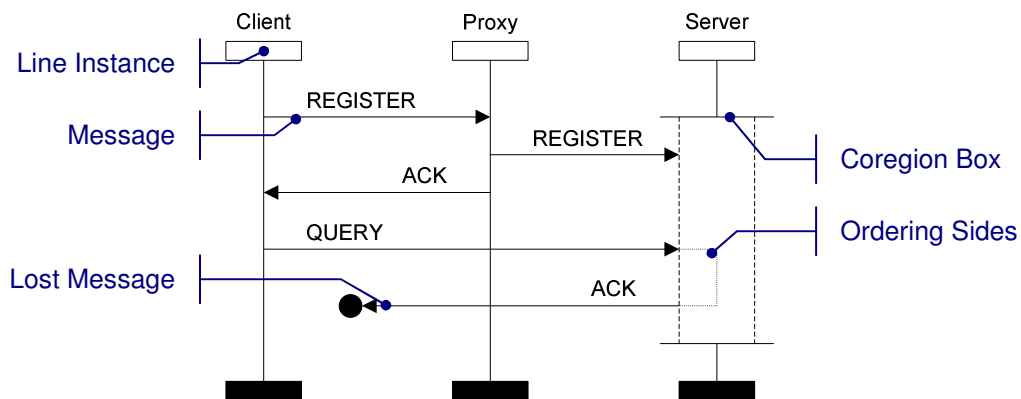
Rotations and flip operations do not change the semantics. For example, vertically flipped HMSC Start Symbol will not become an End Symbol. Upper edge of vertically flipped stencils appears to be the bottom edge.

Changing arrowheads of directed lines do not change the semantics. For example, changing arrowheads of a HMSC Connection Arrow will not affect the flow direction. The arrowhead must always be at the “end” of a respective line segment (see menu “Format – Line”).

Stencils for Basic MSC

A basic MSC can be created by gluing several basic MSC stencils to form a single drawing according to the ITU-T Z.120 standard.

The following figure shows various stencils in a sample basic MSC.



The following stencils may be used to draw a basic MSC.



Line Instance



Coregion Box











Headless Instance; semantically identical to the Line Instance.



Message (Left)



Message (Right); identical to a rotated (or horizontally flipped) Message (Left) symbol.

-  Lost Message
-  Found Message
-  Action (ignored during validation)
-  Condition (ignored during validation)
-  Ordering Line
-  Ordering Side-Side; semantically identical to Ordering Line.
-  Ordering Sides; semantically identical to Ordering Line.
-  Ordering Arrow; semantically identical to Ordering Line, but better determines the order (see below).

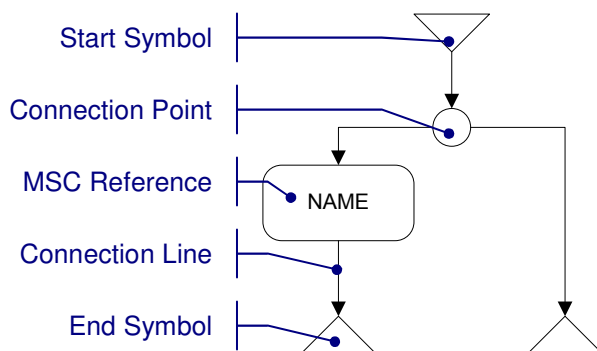
Event Ordering

Events connected by an arrowed line occur in the arrow direction. If no arrow symbol is used, the event that is graphically higher occurs before the lower event. Events on the same height can be connected by arrowed lines only.


Stencils for HMSC

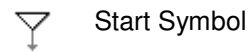
A high-level MSC (HMSC) can be created by gluing several HMSC stencils to form a single drawing according to the ITU-T Z.120 standard.

The following figure shows various stencils in a sample HMSC.



The following stencils may be used to draw a HMSC.

-  Connection Point



Start Symbol



End Symbol



MSC Reference



Condition (ignored during validation)



Connection Line



Connection Arrow; semantically identical to Connection Line, but better determines the flow direction (see below).

References

HMSC may reference basic MSC, or another HMSC drawing. Direct or indirect recursion (self-references) is not allowed.

The referenced charts must be on different pages of the same Visio document. This version of SCStudio cannot load MSC from external files.

Flow Direction

The incoming Connection Lines (or Arrows) must be always connected to the top edge of the node symbols, whereas the outgoing connections must be connected to bottom edge.

This version of SCStudio is not able to determine flow direction of Connection Lines between two Connection Points. You can use Connection Arrows instead.

Common Stencils

The following stencils may be used on any MSC drawing.



Comment



Text



Time Interval (ignored during validation)



Directed Interval (ignored during validation)

Export and Import

The “File – Save” and “File – Save As” functions will save the active document in some of the graphical formats directly supported by Microsoft Visio.

File Formats

The SCStudio can additionally export and import few MSC document formats. This SCStudio version supports the following formats:

- (export only) Textual MSC representation standardized in ITU-T Z.120 (.mpr).
- (import only) Proprietary representation of basic MSC created by Steffen Engmann (.cfi).

To invoke export/import, select menu “Check – Drawing – Export/Import”.

Repaint

The repaint function can be used to upgrade shapes in an MSC document to a newer SCStudio version. All drawings in the active document will be updated.

To invoke repaint, select menu “Check – Drawing – Repaint”.

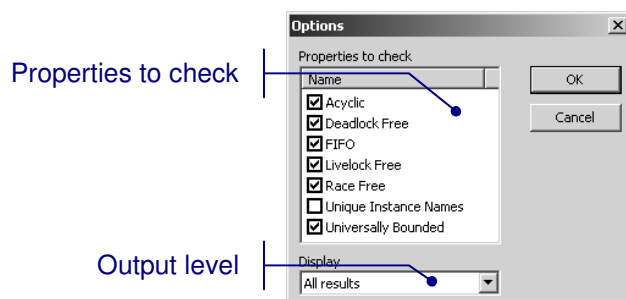
Options

Behavior of the SCStudio can be configured in the Options dialog.

The list “Properties to check” identifies all properties that will be checked when user triggers the verification.

The “Display” item defines content of the Verification Report.

- Errors only: Only violated properties will be reported.
- Errors and warnings: Violated properties and verification warnings will be reported.
- All results: Results of all executed checks will be reported.



To invoke the Options dialog, select menu “Check – Options”.

Frequently Asked Questions

Q: The “Check – Drawing – Export...” menu item is disabled.

A: The verification/export modules are not loaded. Please reinstall the scstudio application, or add a path to the "bin" subdirectory into the PATH environment variable.

Verification

Introduction

Invocation

To trigger verification of an actual drawing, select menu "Check – Run".

The SCStudio verifies actual drawing, including all charts referenced from that drawing (see MSC Reference).

This SCStudio version checks the following properties:

- Acyclic (in basic MSC only)
- FIFO (in basic MSC only)
- Deadlock Free (in HMSC only)
- Livelock Free (in HMSC only)
- Race Free (in both basic MSC, HMSC)
- Universally Bounded (in HMSC only)

Verification Report

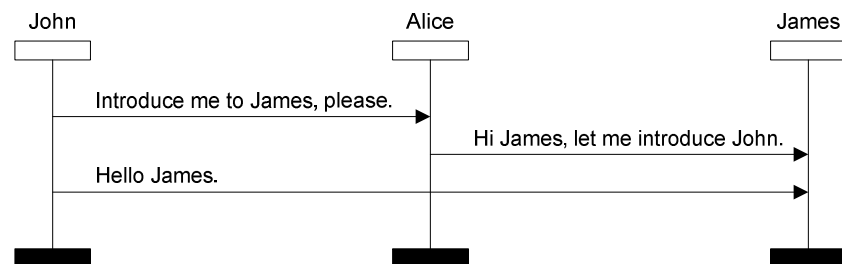
Errors and warnings will be listed in a "Verification Report". Some lines in the report may include hypertext links. If you click that link in a report, related shapes in your drawing will be selected. This may help you to locate the error.

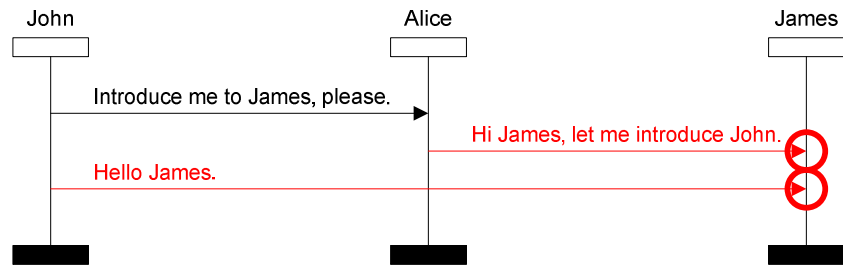
Counter example

Errors generated by verification algorithms will display an example that violates the verified property. These examples are displayed in a new document. Each counter example shows portions of the original drawing, having erroneous parts highlighted.

The original document remains unchanged. You may rearrange both original and counter-example documents using the "Window – Tile" menu command.

The following figure shows a sample MSC and a respective counter-example for a race condition (meaning the messages might come in a different order).





Frequently Asked Questions

Q: There is no "Check" button in my document.

A: The add-on is not started. Please check the Basic Instructions on software Operation.

Q: The verification reports "No verification algorithms applicable."

A: The verification/export modules are not loaded. Please reinstall the scstudio application, or add a path to the "bin" subdirectory into the PATH environment variable.

Customization

Users may customize the SCStudio through developing custom stencils, or custom verification algorithms.

Licensing

The SCStudio is distributed under LGPL. This license allows proprietary (closed-source) customization, so the enhancements may stay confidential. However, we encourage you to share the customizations and contribute your enhancements to the mainline SCStudio whenever possible.

Custom Stencils

You may develop new shapes to support a custom graphical syntax.

You need to run Visio in a developer mode. From menu Tools – Options, choose the tab “Advanced”, enable “Run in developer mode” and click OK.

ShapeSheet

To display a sheet configuration, select “Show ShapeSheet” in the shape context menu (mouse right-click).

To enable your stencil for use in SCStudio:

- Set the user-defined cell “User.mscSymbol” to indicate the assigned MSC symbol;
- Set the EventDrop to trigger SCStudio; use the formula `RUNADDONWARGS("Sequence Chart Studio","/event=100")`

Custom Algorithms

You may develop custom verification algorithms.

Prerequisites

To build the SCStudio you need the following software:

- some version of Boost libraries; a Windows installer is available at <http://www.boostpro.com/products/free>

Installation

To install the add-on manually, without any installer:

- Copy all *.vsl and *.dll files into a "bin" subdirectory, e.g. in C:\Program Files\SCStudio\bin
- Copy everything in stencils\ into the "stencils" subdirectory, e.g. C:\Program Files\SCStudio\stencils.
- Start Microsoft Visio 2003, select menu Tools – Options, choose the tab "Advanced", and click the "File Paths..." button.

- Register each module by inserting its filename as a string value HKCU (or HKCM) Software\Sequence Chart Studio\Modules, e.g.

```
[HKCU\Software\Sequence Chart Studio]
"ModulesPath"="C:\Program Files\SCStudio\bin"
[HKCU\Software\Sequence Chart Studio\Modules]
"sc_liveness"="scliveness.dll"
"sc_order"="scorder.dll"
"sc_race"="scrace.dll"
"sc_z120"="scZ120.dll"
```

- Register each verified property by inserting its name as a new key under HKCU Software\Sequence Chart Studio\Checks, e.g.

```
[HKCU\Software\Sequence Chart Studio\Checks\Acyclic]
[HKCU\Software\Sequence Chart Studio\Checks\FIFO]
[HKCU\Software\Sequence Chart Studio\Checks\Livelock Free]
[HKCU\Software\Sequence Chart Studio\Checks\Deadlock Free]
[HKCU\Software\Sequence Chart Studio\Checks\Race Free]
```

- Enter the "bin" path into the "Add-ons" field.
- Enter the "stencils" path into the "Templates" and "Stencils" fields.
- Click OK and restart Visio.