RTG4 uPROM

Configuration User Guide

Microsemi

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Introduction

The RTG4 device features an embedded micro programmable read-only memory (uPROM) in the silicon, which is used for storing program data. The uPROM has a custom fabric interface that users can use to read data from their application.

The uPROM can hold up to 10400 36-bit words.

Refer to the RTG4 FPGA Fabric User Guide for more information.

Libero provides the uPROM Configurator for you to configure the uPROM. The memory clients you have configured for the uPROM will be programmed along with the fabric.

After Place and Route, you can update/modify the Memory Clients in the uPROM before it is programmed. There is no need to rerun Place and Route after the update to the uPROM content. See "Update uPROM Memory Content" on page 11.

1 – uPROM Configuration

uPROM Configurator

The uPROM Configurator is available from the Catalog tab. To invoke the Configurator:

1. Expand Memory & Controllers in the Catalog.
2. Do one of the following to invoke the uPROM Configurator:
   – Double-click or right-click RTG4 uPROM and choose **Instantiate in *<design_name>*** to instantiate the uPROM in the SmartDesign canvas.
   – Double-click or right-click RTG4 uPROM and choose **Configure Core**. Enter a component name for the uPROM when prompted.

   See Figure 1-1.

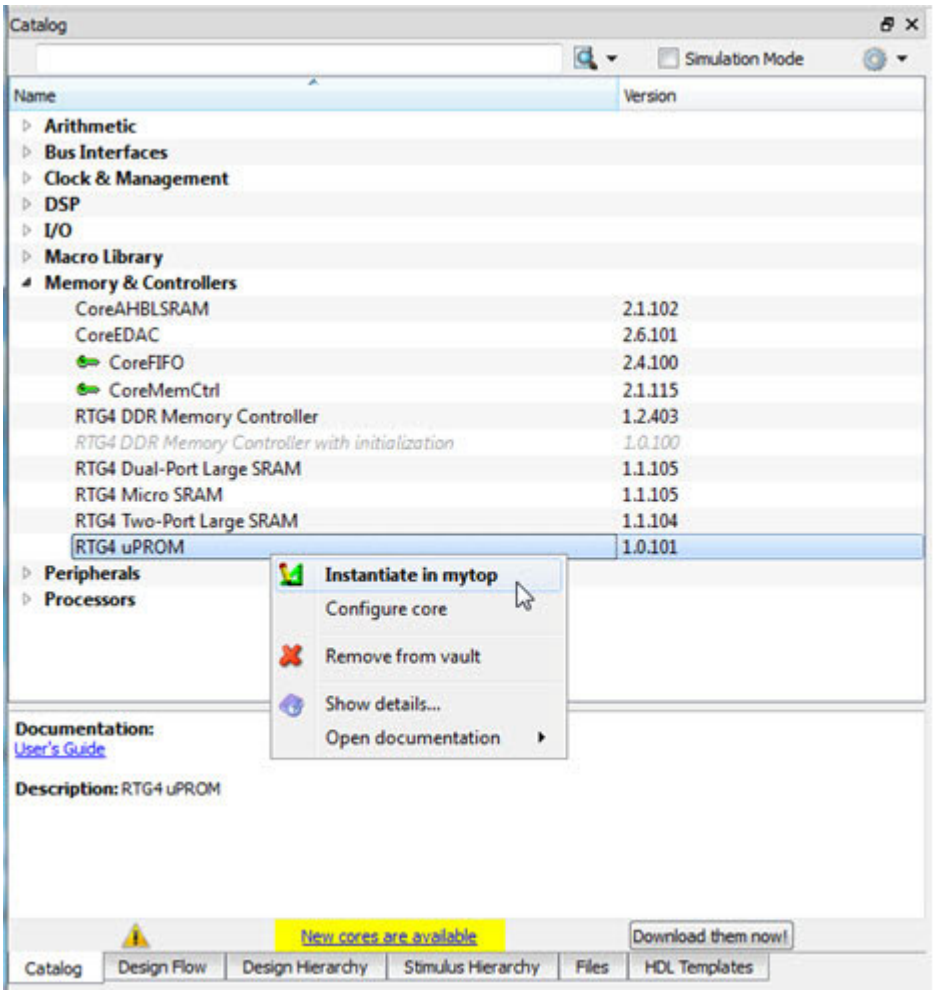

***Figure 1-1* • RTG4 uPROM Core in Catalog**

3. In the uPROM Configurator, click **Add Clients to System** to add a Client to the uPROM (Figure 1-2).

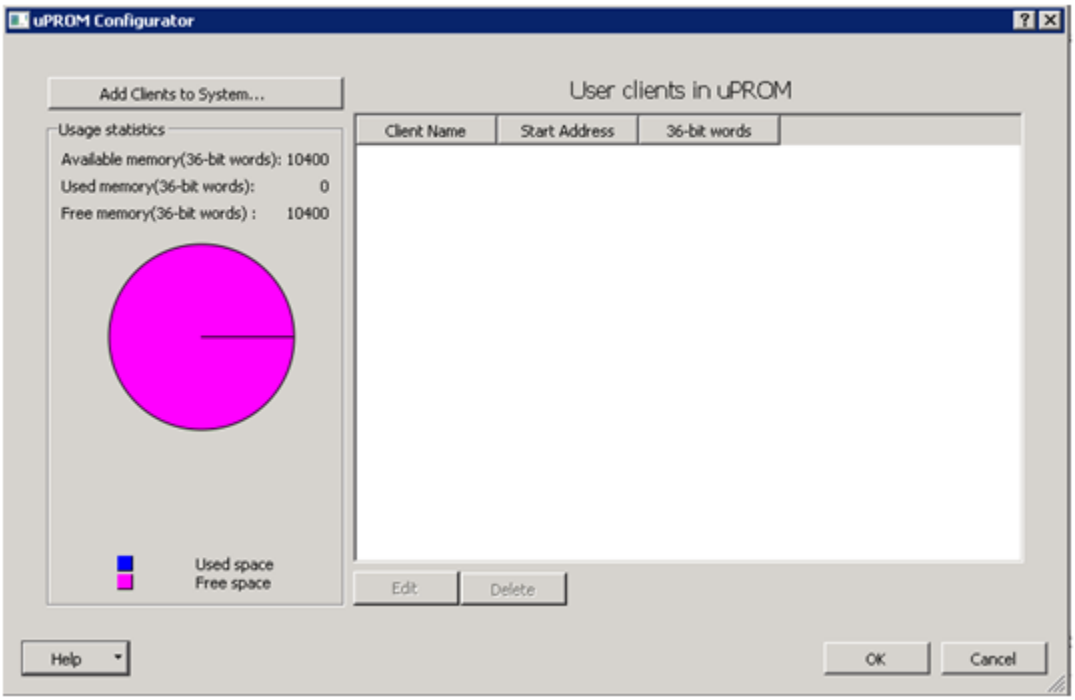

Figure 1-2 **• RTG4 uPROM Configurator**

Usage statistics

Usage statistics displays the total memory size of the uPROM, the size of used memory and free memory. All memory sizes are expressed in terms of the number of 36-bit words.

Available memory

The uPROM can hold 10,400 36-bit words (total 374400 bits).

Used memory

When you add memory clients, the Used memory displays the total amount of memory (number of 36-bit words) used by all clients. This is indicated in blue in the pie chart.

Free memory

Free memory (number of 36-bit words) is displayed in magenta in the pie chart.

Add Clients to System

Click **Add Clients to System** to open the Add Data Storage Client dialog box (Figure 1-3). This dialog box enables you to specify the start address, client size, the content of the client and whether or not to use the memory content for simulation.

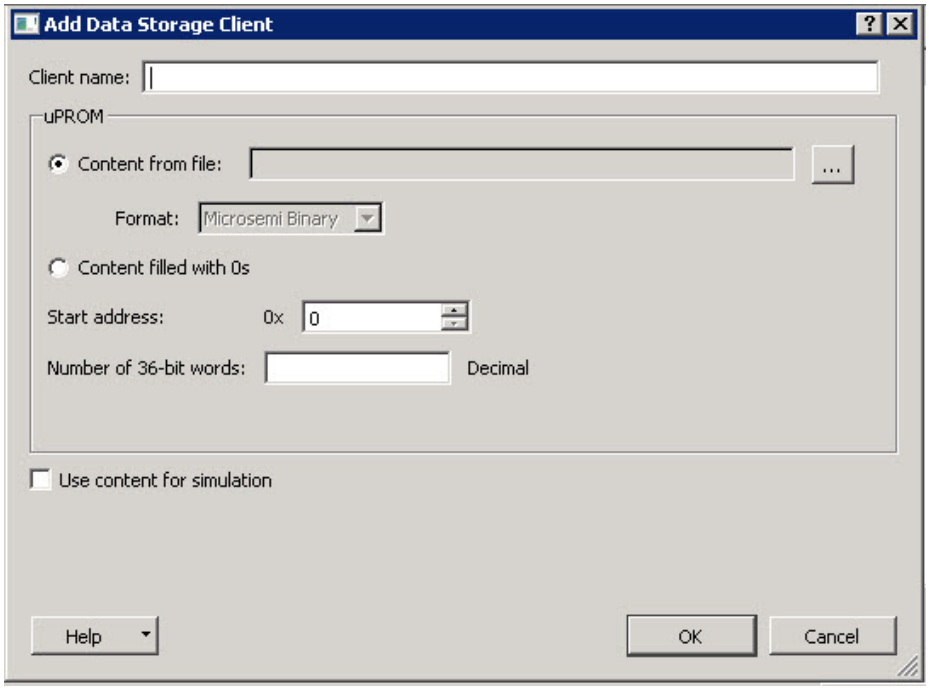

***Figure 1-3* • Add Data Storage Client Dialog Box**

Client name

Enter a name for your memory client.

Content from file

You can load your memory client from a memory file with this option. Click **Browse** to navigate to the location of the memory file you want to load. uPROM supports only the Microsemi Binary format (*.mem) for the memory content. The *. mem file must meet the following requirements:

- Each row is one 36-bit binary word (only 0s and 1s).
- Only 0s and 1s are allowed.
- The number of rows in the file (word count) should be less than or equal to the memory space of the uPROM (up to 10,400 words).
- The memory file must have the *.mem file extension.

Figure 1-4 shows an example memory file.

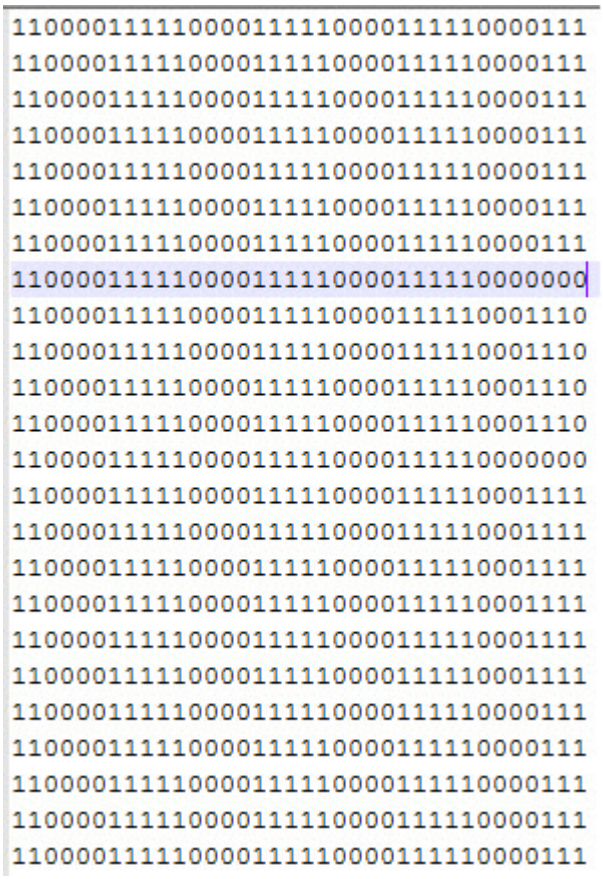

***Figure 1-4* • Microsemi Binary File (*.mem) Example**

Content filled with 0s

Fill the content of the memory client with 0s as a place holder. You can update the memory client after Place and Route and before Programming. There is no need to rerun Place and Route after you update the uPROM Memory Content. See "Update uPROM Memory Content" on page 11 for details.

Start address

Enter the Start address (14-bit) of your client in HEX. Valid values are from 0x0 to 0x289F (HEX).

Number of 36-bit words

Enter the size of your client (expressed as the number of 36-bit words) in decimal.

Note: When multiple clients are added, ensure that the address range of each client does not overlap with the other clients. Overlapping of address range is not allowed and will be flagged as an error when it occurs.

Use content for simulation

Check this box to include your memory content for simulation. When this box is checked, a uPROM.mem file is automatically created in the <prj_location>/simulation folder when simulation is invoked in the Design Flow window. The uPROM.mem file is read by the uPROM simulation model to initialize the

uPROM content when the simulation starts. Only clients with the "Use Client for Simulation" check box checked have the contents added to the UPROM.mem file for simulation.

The clients you have added appear in the User clients in uPROM pane (Figure 1-5).

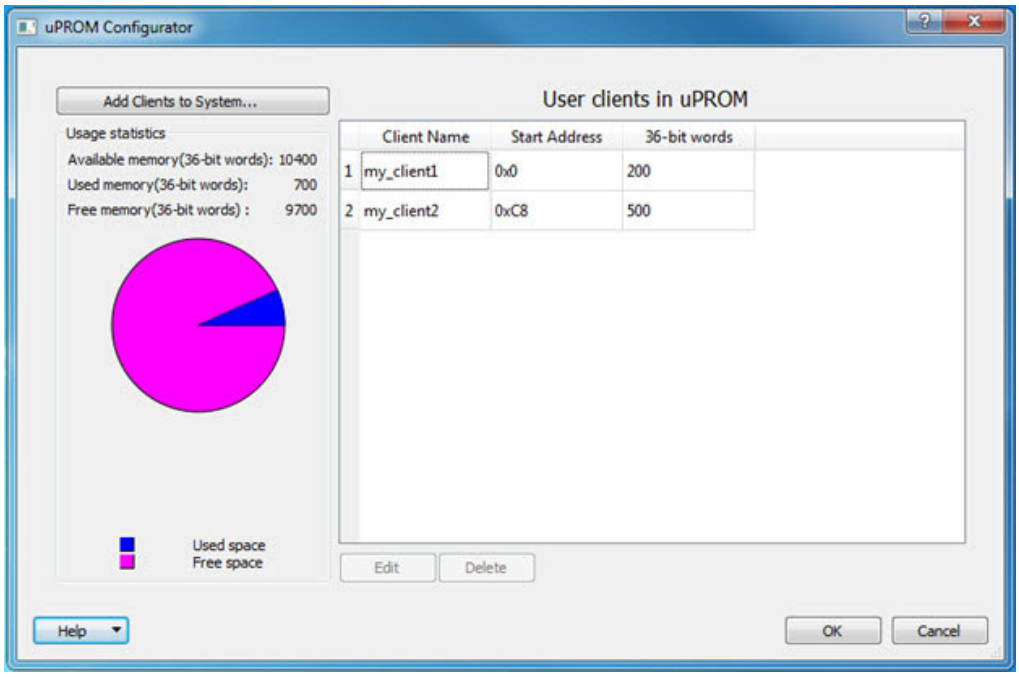

Figure 1-5 • **User Clients Added**

DRC Rules and Error Messages

To prevent out-of-bound memory addressing and overlapping of address space, DRC rules are enforced and error messages are given when:

- An invalid start address (outside of the uPROM memory space) is entered. The uPROM address range is 0x0000 through 0x289F (HEX).

  DRC Error: The specified start address is invalid; legal addresses range from 0x0 to 0x289F.
- The start address and the number of words the user has entered put the user client beyond the memory space of the uPROM.

  DRC Error: For the specified start address the number of words cannot exceed the total number of words of 10400.
- The number of 36-bit words the user has entered is less than the number of words in the memory file used to fill the content of the client.

  DRC Error: The number of words cannot be less than the number of words <mem_file_word_count> specified in the memory file < mem_file_name>.
- There is more than one user client and the address range of one client overlaps with that of another.

  DRC Error: This client overlaps with: <client name >.
- The memory file (*.mem) size exceeds the total uPROM memory space.

  DRC Error: The memory file <memoryFileName> size exceeds the total uPROM space.

Editing a Client

To edit a client, right-click the client and choose **Edit** (Figure 1-6) to open the Edit Data Storage Client dialog box.

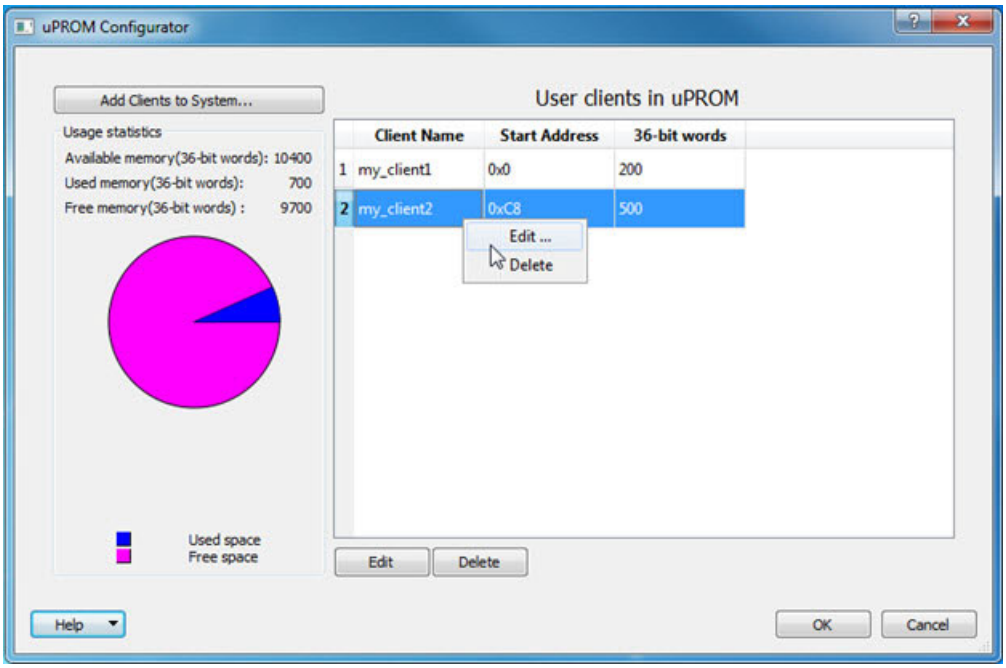

***Figure 1-6* • Editing User Clients**

Make your changes in the Edit Data Storage Client dialog box and click **OK** to save your edits (Figure 1-7).

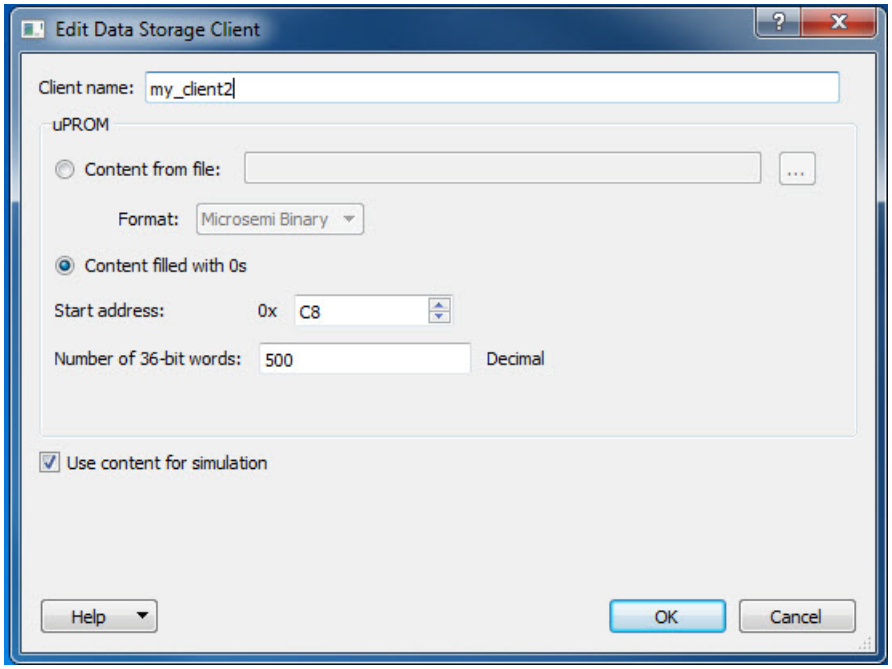

***Figure 1-7* • Edit Data Storage Client Dialog Box**

Deleting a Client

Right-click the client and choose **Delete**. (Figure 1-8)

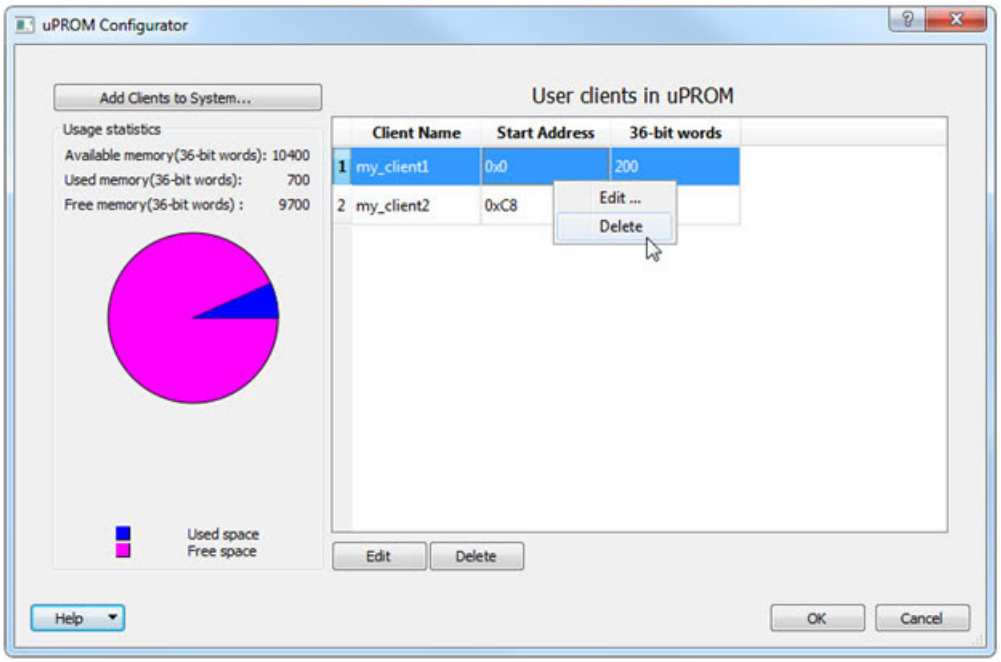

***Figure 1-8* • Deleting a Client**

Update uPROM Memory Content

The Update uPROM Memory Content tool is useful if you have reserved space in the uPROM Configurator and you want to make changes to the uPROM client after Place and Route. After you have made the updates to the uPROM Memory Content, there is no need to rerun Place and Route.

To update the uPROM Memory Content from the Design Flow window:

1. Right-click Update uPROM Memory Content in the Design Flow window and choose **Configure Options**. (Figure 1-9)

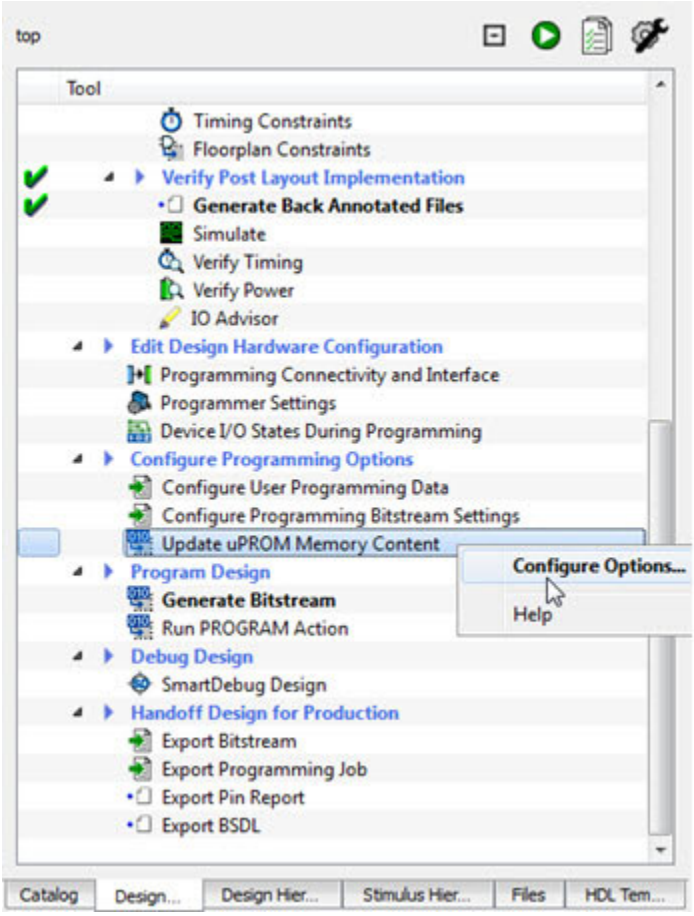

***Figure 1-9* • Update uPROM Memory Content**

2. When the uPROM Update Tool appears, right-click the Memory Client you want to update and choose **Edit** (Figure 1-10).

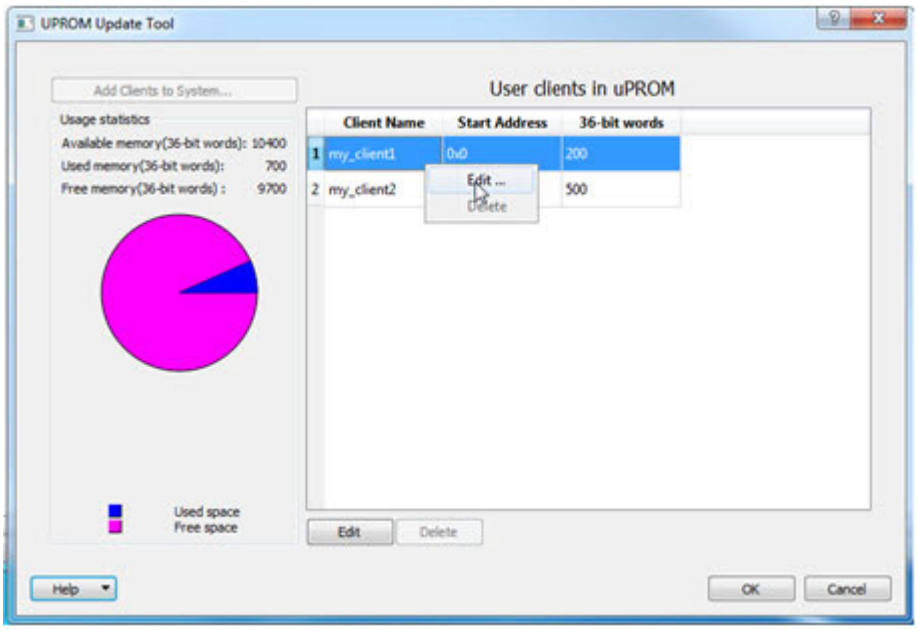

Figure 1-10 • **uPROM Update tool**

The Edit Data Storage Client dialog box appears (Figure 1-11).

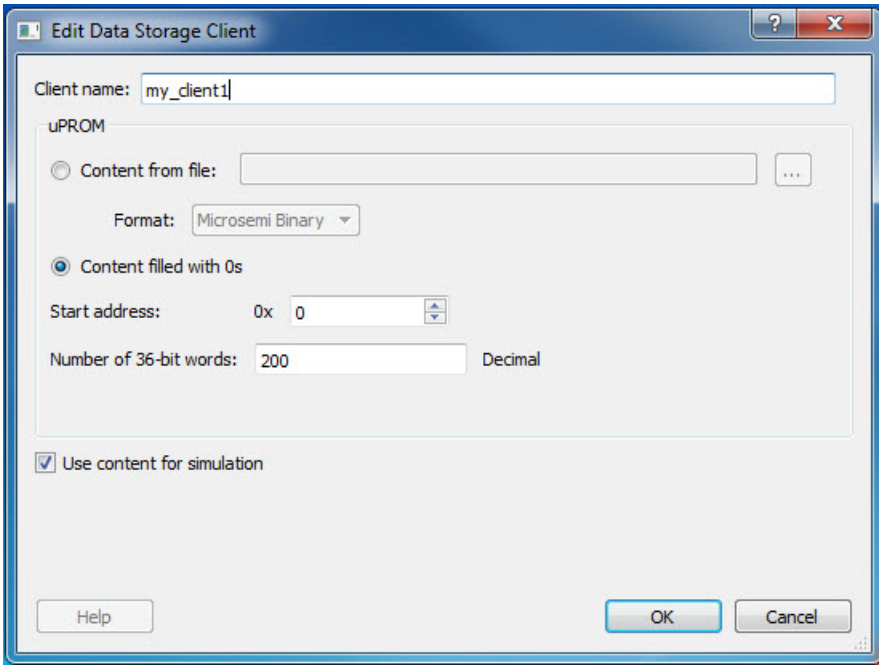

Figure 1-11 • **Edit Data Storage Client Dialog Box**

You may make the following changes to the uPROM client:

- Rename a client
- Change the memory content, memory size and start address of the client
- Reverse your decision on whether or not to use content for simulation

Note: You cannot use the uPROM Update Tool to add or delete a client. To add or delete a client, you must use the uPROM Configurator to reconfigure your clients and regenerate your uPROM component and your design.

A – Product Support

Microsemi SoC Products Group backs its products with various support services, including Customer Service, Customer Technical Support Center, a website, electronic mail, and worldwide sales offices. This appendix contains information about contacting Microsemi SoC Products Group and using these support services.

Customer Service

Contact Customer Service for non-technical product support, such as product pricing, product upgrades, update information, order status, and authorization.

From North America, call 800.262.1060
From the rest of the world, call 650.318.4460
Fax, from anywhere in the world, 408.643.6913

Customer Technical Support Center

Microsemi SoC Products Group staffs its Customer Technical Support Center with highly skilled engineers who can help answer your hardware, software, and design questions about Microsemi SoC Products. The Customer Technical Support Center spends a great deal of time creating application notes, answers to common design cycle questions, documentation of known issues, and various FAQs. So, before you contact us, please visit our online resources. It is very likely we have already answered your questions.

Technical Support

Visit the Customer Support website (www.microsemi.com/soc/support/search/default.aspx) for more information and support. Many answers available on the searchable web resource include diagrams, illustrations, and links to other resources on the website.

Website

You can browse a variety of technical and non-technical information on the SoC home page, at www.microsemi.com/soc.

Contacting the Customer Technical Support Center

Highly skilled engineers staff the Technical Support Center. The Technical Support Center can be contacted by email or through the Microsemi SoC Products Group website.

Email

You can communicate your technical questions to our email address and receive answers back by email, fax, or phone. Also, if you have design problems, you can email your design files to receive assistance. We constantly monitor the email account throughout the day. When sending your request to us, please be sure to include your full name, company name, and your contact information for efficient processing of your request.

The technical support email address is soc_tech@microsemi.com.

My Cases

Microsemi SoC Products Group customers may submit and track technical cases online by going to My Cases.

Outside the U.S.

Customers needing assistance outside the US time zones can either contact technical support via email (soc_tech@microsemi.com) or contact a local sales office. Sales office listings can be found at www.microsemi.com/soc/company/contact/default.aspx.

ITAR Technical Support

For technical support on RH and RT FPGAs that are regulated by International Traffic in Arms Regulations (ITAR), contact us via soc_tech_itar@microsemi.com. Alternatively, within My Cases, select **Yes** in the ITAR drop-down list. For a complete list of ITAR-regulated Microsemi FPGAs, visit the ITAR web page.

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