Metodology for developing a Real-Time Operating System based on RISC-V Assembly language

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**Abstract.** Real-Time operating systems are usage in many different domains. They can be used in military industries. There are OS for robotics ROS, for drones, for missile system control and for aircraft control system. RiSC-V architecture and assembly language will becomes dominate architecture for developing of RTOS in this field. This paper describes Metodology for developing a real-time operating system based on RISC-V Assembly language.

# Materials and methods

# Introduction

The Real-time operating system is based on RISC-V assembly language and it can be used on several types of embedded systems. The OS will be modular. The modules will be:

* bootloader module
* init module
* memory-management module
* process-management module
* exit module

Conceptual Model of the OS will be developed. Modules will be developed as functions. The OS will be tested in QEMU virtual machine. The build system Make will be used for testing of the OS. After testing the OS can be deployed to physical embedded system. Deployment of the OS will be automated with pipelines written with Make.

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# mathematics (first level heading) (Use the Microsoft Word template style: *Heading 1*) or (Use Times New Roman Font: 12 pt, Bold, ALL CAPS, Centered)

Here we provide some basic advice for formatting your mathematics, but we do not attempt to define detailed styles or specifications for mathematical typesetting. You should use the standard styles, symbols, and conventions for the field/discipline you are writing about.

## A Note on Microsoft Word’s Equation Editors (Second Level Heading) (Use the Microsoft Word template style: *Heading 2*) or (Use Times New Roman Font: 12 pt, Bold, Centered)

From Word 2007 onwards, Microsoft Word provides two “Equation Editors,” which, for ease of reference, we’ll call “Old Style Equations” and “New Style Equations.”

* **“New Style Equations”** (Word 2007 onwards): With Word 2007 Microsoft introduced a powerful new built-in Equation Editor that enables input of sophisticated mathematics typeset (usually) in the Cambria Math font. You access it from the Insert menu.
* **“Old Style Equations”** (Word 97–Word 2003): For versions of Microsoft Word between Word 97 and Word 2003, mathematical input was created by an add-in: Inserting and editing a “Microsoft Equation 3.0 object,” typically by *Insert* ð *Object* and selecting “Microsoft Equation 3.0.”

Newer versions of Microsoft Word (Word 2007 and onwards) still support the original “Old Style Equations” method of creating mathematics by inserting an equation via *Insert* ð *Object* and selecting “Microsoft Equation 3.0.” Whatever method is used, please make sure the equation is clear and readable.

## Which Microsoft Word Equation Editor Should I Use? (Second Level Heading) (Use the Microsoft Word template style: *Heading 2*) or (Use Times New Roman Font: 12 pt, Bold, Centered)

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## Formatting and Inserting Equations (Second Level Heading) (Use the Microsoft Word template style: *Heading 2*) or (Use Times New Roman Font: 12 pt, Bold, Centered)

Equations should be centered with equation numbers on the right-hand side (flush right). Achieving a pleasing layout of equations can be tricky in Microsoft Word, so here are some tips. You can either:

1. Copy, paste, and edit the sample equation provided (recommended), or
2. Manually insert an equation and equation number

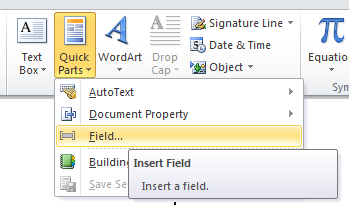
### Copy, Paste, and Edit a Sample Equation (Third Level Heading) (Use the Microsoft Word template style: Heading 3) or (Use Times New Roman Font: 10 pt, Italic, Centered)

To use this “Old Style Equation” as a “template,” highlight the entire line, then use cut and paste to the new location. Note that the equation number will automatically update (increment).

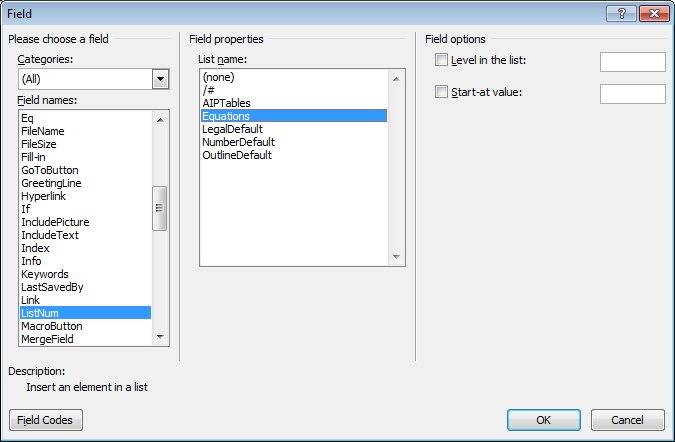
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If you prefer to manually insert and number equations, follow this step-by-step guide:

1. Make sure you can see “hidden characters” by switching on “show invisibles” from the Home menu (it looks like this: ). This allows you to see paragraph markers (¶) and tab characters (à), which are usually hidden from view.
2. Create a blank paragraph by pressing [ENTER].
3. Format your new blank paragraph by applying the Microsoft Word template style: *Equation.* The *Equation* paragraph style sets up the tabs so that you can center the equation and have an equation number appear at the right.
4. Place your cursor at the start of your new paragraph and press the [TAB] key twice.
5. Place your cursor between the tab characters (à) and insert your equation using *Insert* ð *Object* ð *Microsoft Equation 3.0*.
6. To add an equation number, place your cursor at the end of the paragraph (just before the paragraph markers (¶) and after the second tab character (à)).
7. On the *Insert* tab, in the *Text* group, click *Quick Parts* and then click *Field*:



1. A dialog box should appear:



1. From the list of *Field Names* on the left of the dialog box, select *ListNum.*
2. From the list of *Field properties* on the right, select the “Equations” *List name* and click OK. You should now see an equation number in parentheses: e.g., (3).

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|  |  |
| --- | --- |
|  |  |
| (a) | (b) |

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Cite all figures in the text in consecutive order. The word “Figure” should be spelled out if it is the first word of the sentence and abbreviated as “Fig.” elsewhere in the text. Place the figures as close as possible to their first mention in the text at the top or bottom of the page with the figure caption positioned below, all centered. Figures must be inserted in the text and may not follow the Reference section.

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## Tables (Second Level Heading) (Use the Microsoft Word template style: *Heading 2*) or (Use Times New Roman Font: 12 pt, Bold, Centered)

Due to the wide range and complexity of tables, we simply offer an example for guidance. Please follow the style for table (and figure) captions.

|  |  |  |
| --- | --- | --- |
| **TABLE 1.** To format a table caption, use the Microsoft Word template style: *Table Caption*. The text  “**TABLE 1,**” which labels the caption, should be bold and all letters capitalized. Center this text above the Table. Tables should have top and bottom rules, and a rule separating the column heads from the rest of the table only. | | |
| **Column Header Goes Here** | **Column Header Goes Here** | **Column Header Goes Here** |
| Row Name Here | x | x |
| Row Name Here | x | x |
| Row Name Here | x | x |

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1. M. P. Brown and K. Austin, *The New Physique* (Publisher Name, Publisher City, 2005), pp. 25–30.
2. M. P. Brown and K. Austin, Appl. Phys. Letters **85**, 2503–2504 (2004).
3. R. T. Wang, “Title of Chapter,” in *Classic Physiques*, edited by R. B. Hamil (Publisher Name, Publisher City, 1999), pp. 212–213.
4. C. D. Smith and E. F. Jones, “Load-cycling in cubic press,” in *Shock Compression of Condensed Matter-2001*, AIP Conference Proceedings 620, edited by M. D. Furnish *et al*. (AIP Publishing, Melville, NY, 2002), pp. 651–654.
5. B. R. Jackson and T. Pitman, U.S. Patent No. 6,345,224 (8 July 2004)
6. D. L. Davids, “Recovery effects in binary aluminum alloys,” Ph.D. thesis, Harvard University, 1998.
7. R. C. Mikkelson (private communication).+

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