rasm user manual

Title	rasm (Retargetable assembler)
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v1.0.0	2014-02-24 Changed documentation format to RestructuredText. Added COPYING license in separate file.
v0.2.0	2003-04-08 Public adaptation of version 0.1.0.
v0.1.0	2003-04-05 Initial release.

1. Introduction

These are the source files and preliminary documentation of `rasm` (Retargetable assembler) by Nikolaos Kavvadias.

2. Main features

The assembler follows a two-pass strategy. At the first pass, the symbol table is updated with the symbolic branch addresses. At the second pass, full assembly of the source code is taking place, and the symbol table whenever it is necessary to determine an address for a named label.

Its differentiating feature is the coding approach so the user can easily add/ replace instructions or modify the existing instruction formats.

A "toy" instruction set is supported in this version of rasm. The "toy" instruction set is described in the following table:

2.1. Instruction formats

- R-format

31		26	25		21	20		16	15		11	10		0
OpCode			Rd			Rs1			Rs2			unused		

- I-format

31		26	25		21	20		16	15		0
OpCode			Rd			Rs			immed		

- B-format

31		26	25		0
OpCode			branch target address		

2.2. Supported instruction set

Instruction format	OpCode	Description	Action
ADD Rd,Rs1,Rs2	0x04	Add	Rd := Rs1 + Rs2
CMP Rs1,Rs2	0x0B	Compare	flags: Rs1 - Rs2
LD Rd,Rb,Ro	0x08	Load register	Rd := m[Rb+Ro]
MUL Rd,Rs1,Rs2	0x0A	Multiply	Rd := Rs1 * Rs2
ORR Rd,Rs1,Rs2	0x11	Logical OR	Rd := Rs1 ‖ Rs2
ST Rs,Rb,Ro	0x10	Store register	m[Rb+Ro] := Rs
SUB Rd,Rs1,Rs2	0x03	Subtract	Rd := Rs1 - Rs2
ADDI Rd,Rs,#immed	0x05	Add immediate	Rd := Rs + immed
MOV Rd,Rs	0x12	Move register	Rd := Rs
MOVI Rd,#immed	0x09	Move immediate	Rd := immed
B $target	0x16	Branch uncondit.	PC := target
BLT $target	0x17	Branch if less than	**if (flags):** PC := target

3. File description

The RASM distribution includes the following files.

/rasm	Top-level directory
COPYING	License agreement (GPL, version 2 license).
README	This file.
README.html	HTML version of README.

README.pdf	PDF version of README.
rasm.c	Contains the main() routine.
rasm.h	Definitions and constant declaration for the retargetable assembler • bitmask: array of bit-masking constants • opcode: the fixed-size opcode symbol table • instruction format tables (rform, iform, bform)
rasm.y	Grammar description file for the "toy" assembly language.
rasm.lex	Lexical description file for the "toy" assembly language.
rst2docs.sh	Shell script for generating the documentation using `docutils`.
test1.asm	Sample assembly source file.
test1.hex	Sample generated file from the assembler.

4. Deliverables

- C source code for GCC 2.95.x

- executable (`rasm`) for Linux Mandrake 7.1 or above

- Some (very few) test files

- NOT tested (yet) for Microsoft Visual C (4.0 or above)

5. Requirements

- yacc (bison) for grammar analysis and lex (flex) for the lexical analysis part