# 计算机组成原理实验报告

## 一、CPU设计方案综述

### （一）总体设计概述

本CPU为Logisim实现的单周期MIPS-CPU，支持的指令集包含{lw、sw、lb、lbu、sb、lh、lhu、sh、add、addu、sub、subu、and、or、slt、nor、xor、sll、srl、sra、sllv、srlv、srav、sltu、beq、bne、bgtz、blez、bltz、bgez、addi、addiu、andi、ori、xori、lui、slti、sltiu、j、jr、jal、jalr}共42条，其中add和sub不支持溢出中断，但会输出溢出信号。为了实现这些功能，CPU主要包含了instruction\_memory、data\_memory、centrol\_processing\_unit、program\_counter、register\_file、control\_unit、bit\_entender、arithmetic\_logical\_unit、upper\_six、lower\_six、middle\_five，这些模块分成三级，第一级模块为instruction\_memory、data\_memory、centrol\_processing\_unit，centrol\_processing\_unit中包含了第二级模块program\_counter、register\_file、control\_unit、bit\_entender、arithmetic\_logical\_unit，control\_unit包含了第三级模块upper\_six、lower\_six、middle\_five。

### （二）关键模块定义及内部逻辑实现

#### 1. instruction\_memory

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 输入地址 | 输入 | 32位，输入的地址 |
| 2. | 输出指令 | 输出 | 32位，输出的指令 |

注：

1.如果需要改变地址位宽可直接修改splitter来实现。

2.如果需要改变初始指令位置可以修改减法器的减数配合修改PC中初始化的值实现。

内部逻辑：

采用Logisim自带的ROM即可实现。

#### 2. data\_memory

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 时钟信号 | 输入 | 1位，上跳沿更新内存的值 |
| 2. | 异步复位信号 | 输入 | 1位，信号为1时将此模块复位 |
| 3. | 写使能信号 | 输入 | 1位，信号为1时数据对DM的写入有效 |
| 4. | LS类型选择 | 输入 | 3位，对LS按W/H/B等进行选择 |
| 5. | LS内存地址 | 输入 | 32位，写入下述数据的地址 |
| 6. | 写入数据 | 输入 | 32位，写入到上述地址的数据 |
| 7. | 输出数据 | 输出 | 32位，上述地址对应的数据 |

注：

1.LS类型选择信号的高两位选择load和write针对word(信号的高两位为0)half(信号的高两位为1)还是byte(信号的高两位为2)，LS类型选择信号的最低位仅对load有效，当load half或load byte时用以选择零扩展(0)或符号扩展(1)。

2.如果需要改变地址位宽可直接修改splitter来实现。

3.写使能信号为1时，输出数据无意义，为高阻态，若两个选择信号中有非法(3)的情况，写入或输出的数据为0x7fffffff。

内部逻辑：

采用Logisim自带的RAM实现，同时按照word/half/byte和零扩展/符号扩展进行处理，用数据选择器实现对LS类型选择的支持。

#### 3. centrol\_processing\_unit

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 时钟信号 | 输入 | 1位，上跳沿更新其中PC和GRF的值 |
| 2. | 异步复位信号 | 输入 | 1位，信号为1时将其中的PC和GRF复位 |
| 3. | 输入指令 | 输入 | 32位，由IM给出的当前指令地址的指令 |
| 4. | 输入数据 | 输入 | 32位，由DM给出的当前数据地址的数据 |
| 5. | 输出指令地址 | 输出 | 32位，下一条输入指令在IM中的地址 |
| 6. | GRF写使能信号 | 输出 | 1位，信号为1时数据对GRF的写入有效(输出此信号以使OJ评判CPU正确性) |
| 7. | GRF写入地址 | 输出 | 5位，对GRF写入下述数据的地址(输出此信号以使OJ评判CPU正确性) |
| 8. | GRF写入数据 | 输出 | 32位，对GRF写入到上述地址的数据(输出此信号以使OJ评判CPU正确性) |
| 9. | ALU溢出信号 | 输出 | 1位，当前指令为add或sub且结果发生溢出时，此信号为1 |
| 10. | DM写使能信号 | 输出 | 1位，信号为1时数据对DM的写入有效 |
| 11. | DM的LS类型选择 | 输出 | 32位，对LS按W/H/B等进行选择 |
| 12. | DM的LS内存地址 | 输出 | 32位，DM写入下述数据的地址 |
| 13. | DM的写入数据 | 输出 | 32位，DM上述地址对应的数据 |

注：

1.本CPU的IM和DM指令均采用24位，顶层模块在输出DM的LS内存地址时需使用splitter截取第二位到第六位输出。

内部逻辑：

包含了program\_counter、register\_file、control\_unit、bit\_entender、arithmetic\_logical\_unit等模块，对输入的指令提取指定位在control\_unit中进行译码，得到控制信号输入给program\_counter、register\_file、bit\_entender、arithmetic\_logical\_unit等模块或输出，并通过PC给出下一条指令的地址，各模块详细的内部逻辑实现如下文所述。

#### 4. program\_counter

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 时钟信号 | 输入 | 1位，上跳沿更新当前指令地址为下一条指令地址 |
| 2. | 异步复位信号 | 输入 | 1位，信号为1时将当前指令恢复到初始化时的值 |
| 3. | 立即数分支地址 | 输入 | 32位，处理b类指令时得到的已处理的跳转地址，配合分支选择信号实现分支 |
| 4. | 立即数跳转地址 | 输入 | 24位，处理j和jal指令时得到的未处理的跳转地址，配合跳转选择信号实现跳转 |
| 5. | 寄存器跳转地址 | 输入 | 32位，处理jr和jalr指令时得到的来自寄存器的跳转地址，配合跳转选择信号实现跳转 |
| 6. | 分支选择信号 | 输入 | 1位，用来选择下一条指令，如果是0就选择当前指令加四，否则选择立即数分支地址 |
| 7. | 跳转选择信号 | 输入 | 2位，用来选择下一条指令，如果是0就选择经过分支选择信号选择的信号，如果是1就选择经过处理的立即数跳转地址，如果是2就选择寄存器跳转地址 |
| 8. | 当前指令地址 | 输出 | 32位，当前指令的地址 |
| 9. | 下一条指令地址 | 输出 | 32位，当前指令加四，即没有分支或跳转的情况下，下一条指令应该的地址 |

注：

1.如果需要改变地址位宽可直接修改splitter来实现。

2.如果需要改变初始指令地址可以修改初始化的值配合修改IM中减法器的减数实现。

3.处理B类指令时得到的已处理的跳转地址是指已经对立即数进行了零扩展，左移两位和加下一条地址。

4.处理j和jal指令时得到的未处理的跳转地址是指来自当前指令0到25位的立即数。

5.经过处理的立即数跳转地址是指对4中立即数零扩展到28位，左移两位作为低28位，下一条地址的高4位作为高4位得到的地址。

6.若跳转选择信号非法(3)，下一条指令的地址为0x7fffffff。

内部逻辑：

通过一个寄存器存储当前指令并在时钟上跳沿更新其中内容，同时计算出上述立即数分支地址，立即数跳转地址，寄存器跳转地址和下一条指令地址，通过数据选择器选择需要存入的下一条指令，使用一个计数器配合数据选择器实现对第一条指令地址的初始化。

#### 5. register\_file

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 时钟信号 | 输入 | 1位，上跳沿更新内存的值 |
| 2. | 异步复位信号 | 输入 | 1位，信号为1时将此模块复位 |
| 3. | 写使能信号 | 输入 | 1位，信号为1时数据对GRF的写入有效 |
| 4. | 写31号寄存器 | 输入 | 1位，信号为1时如果写入数据，数据写入到$31 |
| 5. | 读取地址1 | 输入 | 5位，读取到下述输出数据1的数据的地址 |
| 6. | 读取地址2 | 输入 | 5位，读取到下述输出数据2的数据的地址 |
| 7. | 写入地址3 | 输入 | 5位，写入下述输入数据的地址 |
| 8. | 输入数据 | 输入 | 32位，上述写入地址3需要写入的数据 |
| 9. | 输出数据1 | 输出 | 32位，上述读取地址1对应的数据 |
| 10. | 输出数据2 | 输出 | 32位，上述读取地址2对应的数据 |

注：

1.为实现jal单独增加了31号寄存器的控制信号，因此输出写寄存器的地址时需要考虑这一点，当31号寄存器的控制信号为1时输出0x1f。

内部逻辑：

采用解码器和数据选择器将5位地址对应到32个寄存器之一。

#### 6. control\_unit

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 第一段输入指令 | 输入 | 6位，当前指令的高六位，以此判断指令类型 |
| 2. | 第二段输入指令 | 输入 | 6位，当前指令的低六位，若高六位全零，说明是R类型指令，以此判断指令类型 |
| 3. | 第三段输入指令 | 输入 | 5位，当前指令的第16到20位，处理bltz和bgez指令时用以判断指令类型 |
| 4. | 寄存器写入选择 | 输出 | 1位，选择将ALU的结果写入寄存器(0)还是从DM中取出数据写入寄存器(1) |
| 5. | 内存写入使能 | 输出 | 1位，信号为1时数据对DM的写入有效 |
| 6. | 分支控制信号 | 输出 | 1位，信号为1时若ALU输出为0则进行分支跳转 |
| 7. | ALU功能选择信号 | 输出 | 5位，控制ALU进行不同的运算操作，详细定义见ALU部分 |
| 8. | ALU输入选择信号 | 输出 | 2位，选择ALU的输入，高位用以选择第一个操作数来自GRF第一个输出(0)还是立即数(1)，低位用以选择第二个操作数来自GRF第二个输出(0)还是立即数(1) |
| 9. | 寄存器写入地址选择 | 输出 | 1位，选择GRF的写入地址来自指令[20:16](0)还是[15:11](1) |
| 10. | 寄存器使能信号 | 输出 | 1位，信号为1时数据对GRF的写入有效 |
| 11. | LS类型选择信号 | 输出 | 3位，在DM对LS按W/H/B等进行选择 |
| 12. | 位扩展选择信号 | 输出 | 2位，控制对立即数的扩展方式，分为符号扩展(0)，零扩展(1)和部分位零扩展(2) |
| 13. | 判断溢出信号 | 输出 | 1位，当前指令为add、sub时有效，用以与ALU的溢出信号，得到溢出信号 |
| 14. | 31号寄存器写入 | 输出 | 1位，信号为1时如果写入数据到GRF，数据写入到31号寄存器 |
| 15. | PC跳转选择信号 | 输出 | 2位，用来选择下一条指令，详见PC部分的说明 |
| 16. | PC跳转链接信号 | 输出 | 1位，用以选择写入GRF的数据，为1时将下一条指令地址写入GRF实现跳转并链接 |

注：

1.部分位零扩展指处理sll、srl、sra的时候将[10:6]进行零扩展。

内部逻辑：

将输入信号分为三类处理，先将输出合并成22位信号以方便进行选择，再在选择后分离成需要输出的信号，详见重要机制实现方法-控制模块设计。

#### 7. bit\_entender

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 待扩展数据 | 输入 | 16位，来自当前指令的低16位 |
| 2. | 扩展模式选择 | 输入 | 2位，符号扩展(0)，零扩展(1)和用于sll、srl、sra指令的部分位零扩展(2) |
| 3. | 扩展后数据 | 输出 | 32位，按选择信号要求扩展后的数据 |

注：

1.若选择信号非法(3)，输出为0x7fffffff。

内部逻辑：

分别进行三种扩展，后用数据选择器从扩展结果中选择需要的。

#### 8. arithmetic\_logical\_unit

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 操作数1 | 输入 | 32位，传入ALU的第一个操作数 |
| 2. | 操作数2 | 输入 | 32位，传入ALU的第二个操作数 |
| 3. | 操作类型信号 | 输入 | 5位，ALU操作类型选择信号 |
| 4. | 溢出信号 | 输出 | 1位，ALU结果溢出信号(未判断操作类型) |
| 5. | 结果为零信号 | 输出 | 1位，ALU的计算结果为0时此信号为1 |
| 6. | 运算结果 | 输出 | 32位，两个操作数运算的结果 |

注：

1.溢出判断基于两个运算数符号相同且与结果符号不同，因此需要另行确定当前进行的是add或sub运算，这个信号从control\_unit引出。

2.最多支持32种不同的运算，现已定义了前17种运算，如果进行未定义的运算，得到的结果是0x7fffffff。

3.ALU支持的运算定义表：

|  |  |  |
| --- | --- | --- |
| 序号 | 输入信号 | 执行的操作 |
| 1. | 0 | 两个操作数按位与 |
| 2. | 1 | 两个操作数按位或 |
| 3. | 2 | 两个操作数做加法 |
| 4. | 3 | 两个操作数按位异或 |
| 5. | 4 | 第一个操作数大于0时输出0 |
| 6. | 5 | 第一个操作数小于0时输出0 |
| 7. | 6 | 两个操作数做减法 |
| 8. | 7 | 两个操作数符号比较，第一个操作数更小时输出1 |
| 9. | 8 | 第一个操作数大于等于0时输出0 |
| 10. | 9 | 第二个操作数逻辑左移第一个操作数位 |
| 11. | 10 | 第二个操作数逻辑右移第一个操作数位 |
| 12. | 11 | 第二个操作数算术右移第一个操作数位 |
| 13. | 12 | 两个操作数按位或非 |
| 14. | 13 | 两个操作数不相等时输出0 |
| 15. | 14 | 两个操作数无符号比较，第一个操作数更小时输出1 |
| 16. | 15 | 第一个操作数小于等于0时输出0 |
| 17. | 16 | 将第二个操作数的低16位作为输出的高16位，其余位输出0 |

内部逻辑：

同时进行所有支持的运算，然后将所有运算的结果接入数据选择器选择需要的结果，并进行0和溢出判断。

#### 9. upper\_six

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 当前指令31位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 2. | 当前指令30位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 3. | 当前指令29位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 4. | 当前指令28位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 5. | 当前指令27位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 6. | 当前指令26位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 7. | 合并的控制信号 | 输出 | 22位，输出的控制信号 |

注：

1.为便于后续选择而将22个输出信号全部合并输出。

2.本模块适用的指令为：lw、sw、lb、lbu、sb、lh、lhu、sh、beq、bne、bgtz、blez、addi、andi、ori、xori、lui、slti、sltiu、j、jal。

内部逻辑：

纯与或非门实现的组合逻辑电路，由Logisim分析电路功能直接生成。

#### 10. lower\_six

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 当前指令5位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 2. | 当前指令4位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 3. | 当前指令3位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 4. | 当前指令2位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 5. | 当前指令1位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 6. | 当前指令0位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 7. | 合并的控制信号 | 输出 | 22位，输出的控制信号 |

注：

1.为便于后续选择而将22个输出信号全部合并输出。

2.本模块适用的指令为：add、sub、and、or、slt、nor、xor、sll、srl、sra、sllv、srlv、srav、sltu、jr、jalr。

内部逻辑：

纯与或非门实现的组合逻辑电路，由Logisim分析电路功能直接生成。

#### 11. middle\_five

模块定义：

|  |  |  |  |
| --- | --- | --- | --- |
| 序号 | 功能名称 | 数据方向 | 功能描述 |
| 1. | 当前指令20位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 2. | 当前指令19位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 3. | 当前指令18位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 4. | 当前指令17位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 5. | 当前指令16位 | 输入 | 1位，输入信号，用来进行组合逻辑运算以得到22位控制信号的每一位 |
| 6. | 合并的控制信号 | 输出 | 22位，输出的控制信号 |

注：

1.为便于后续选择而将22个输出信号全部合并输出。

2.本模块适用的指令为：bltz、bgez。

内部逻辑：

纯与或非门实现的组合逻辑电路，由Logisim分析电路功能直接生成。

### （三）控制模块设计

#### 1. 控制模块真值表

为便于表格呈现，将表格分为四部分，将确定bltz、bgez的20-16位填在4-0位的位置，并以前导/进行区分。

第一部分：

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#### 2. 对真值表的处理

考虑到以上指令分三类，lw、sw、lb、lbu、sb、lh、lhu、sh、beq、bne、bgtz、blez、addi、andi、ori、xori、lui、slti、sltiu、j、jal以[31:26]进行编码，add、sub、and、or、slt、nor、xor、sll、srl、sra、sllv、srlv、srav、sltu、jr、jalr[31:26]全为0，以[5:0]编码，bltz、bgez[31:26]仅第26位为1，以[20:16]编码，因此可将指令分为上述三类分别进行处理(即上文中的upper\_six、lower\_six、middle\_five三个模块)，并用数据选择器选择最终的控制信号，以使控制器简洁且有条理。下给出三个模块实际的真值表(为上述真值表的子集，且为便于补全真值表的程序的处理进行了简化)。

upper\_six：

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lower\_six：

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#### 3. 辅助搭建电路的程序

我们需要将上述三个真值表转换为电路实现，手工搭建是一件痛苦的事情，因此考虑使用Logisim的分析电路功能，由于手动修改真值表也是一件痛苦的事情，考虑将上述不完整的真值表补全(即没有定义的输入输出均为X)，从而可以直接将真值表粘贴到Logisim中，以高效的生成电路。

采用c语言编程补全真值表，算法为建立一棵0-1 Tire树，将真值表插入这棵树，最后遍历这棵树，如果某种输入没有被插入则输出全为X，程序代码如下：

#include <stdio.h>

#include <stdlib.h>

typedef struct node

{

bool vis;

char data[15];

struct node \*s[2];

} stu,\*ptr;

ptr root=NULL;

int max,datanum;

unsigned char stk[15];

ptr bulid(int num)

{

if (num==max) return NULL;

ptr now=(ptr)malloc(sizeof(stu));

now->vis=0;

now->s[0]=bulid(num+1);

now->s[1]=bulid(num+1);

return now;

}

bool add()

{

int num;

char tmps[3];

ptr now=root;

for (int i=0;i<max-1;i++)

{

if (scanf("%d",&num)==-1) return 0;

now=now->s[num];

}

now->vis=1;

getchar(),getchar(),getchar();

for (int i=0;i<datanum;i++)

{

if (scanf("%s",tmps)==-1) return 0;

if (tmps[0]=='X') tmps[0]='x';

now->data[i]=tmps[0];

}

return 1;

}

void dfs(ptr now,int num)

{

if (now==NULL) return;

if (num==max-1)

{

for (int i=0;i<max-1;i++)

printf("%d ",stk[i]);

for (int i=0;i<datanum;i++)

if (now->vis) printf("%c ",now->data[i]);

else printf("x ");

puts(""); return;

}

stk[num]=0;

dfs(now->s[0],num+1);

stk[num]=1;

dfs(now->s[1],num+1);

return;

}

int main()

{

scanf("%d %d",&max,&datanum);

max++,root=bulid(0);

while (add());

dfs(root,0);

return 0;

}

从而我们可以得到可粘贴在Logisim分析电路中的真值表，此外，由于Logisim的分析电路功能单次最大支持12个输出，我们需要将22个输出分两次生成，为此我们可以新建一个临时模块，将22个输出的前12个生成电路，将电路粘贴到目标模块中，然后从临时模块中删除当前模块，将22个输出的后10个生成电路，将电路粘贴到目标模块中，并对输入输出进行简单的修改，即可完成控制模块的设计，为便于阅读，生成的真值表见附录1。

## 二、测试方案

### （一）典型测试样例

根据指令的类型，主要构造了九个测试点，如下：

#1

test\_allJ：主要测试四个跳转指令

包含的指令：add,addi,addiu,beq,j,jal,jalr,jr,slti,sw

#2

test\_allB：主要测试六个条件跳转指令

包含的指令：addi,beq,bgez,bgtz,blez,bltz,bne,j,slti,sw

#3

test\_allRP1：主要测试若干R类型的指令，有点多所以分了两个测试点

包含的指令：addi,addu,and,lw,nor,or,sllv,slt,sltu,srav,srlv,subu,sw,xor

#4

test\_allRP2：主要测试若干R类型的指令，有点多所以分了两个测试点

包含的指令：add,addi,addu,and,lw,nor,or,sllv,slt,sltu,srav,srlv,sub,subu,sw,xor

#5

test\_allLW：主要测试八个内存读写指令

包含的指令：addi,beq,j,lb,lbu,lh,lhu,lw,sb,sh,sw

#6

test\_allIP1：主要测试若干I类型的指令，有点多所以分了两个测试点

包含的指令：addi,addiu,andi,ori,sll,srl,sw

#7

test\_allIP2：主要测试若干I类型的指令，有点多所以分了两个测试点

包含的指令：addi,lui,slti,sltiu,sra,sw,xori

#8

test\_narcissistic：实质是跑水仙花数，找个比较长的有意义的程序跑下试试

包含的指令：add,addi,beq,j,jal,jr,slt,slti,sw

#9

test\_quicksort：实质是跑n=100的快排，找个有递归的有意义的程序跑下试试

包含的指令：add,addi,addiu,beq,bgez,bgtz,blez,bltz,bne,j,jal,jr,lw,sll,srl,sub,subi,sw

注：

1.考虑到5位最多可执行32条不同指令，非常不便于测试，因此采用24位IM地址和24为DM地址的CPU进行测试。

2.考虑到Mars得到的程序指令从0x3000开始，为便于测试和提交，此CPU支持任意指定指令的起始地址，只需要指定PC和IM中的两个常量即可，我们可以在测试时将其改成0x3000，在提交时将其改为0。

3.测试点较长，为方便阅读，将这些测试点的rom输入，ram输入和标准答案按顺序放在附录2，附录3，附录4。

### （二）数据构造方法

覆盖所有测试功能正常进行的样例，极端情况的样例，以R指令的测试为例，我们对每个R指令，测试在两个输入分别为正正，负负，正负，负正，零零，正零，负零，正数负数分别包含如1、-1、2147483647,、-2147483648在内的数据和随机数，同时我们会测试ARB、BRA、ARA、BRB，其它测试点的构造类似，具体见MIPS汇编程序，考虑到汇编程序较长，为方便阅读，将这些测试点的汇编代码放在附录5。

### （三）自动测试工具

显然面对上千的输出，肉眼将RAM中的结果与标准答案对比是不现实的，又因为Logisim导出的数据会存在a\*x表示a个x，会忽略前导0，会一行多个输出，考虑用c语言将从RAM导出的数据进行格式化，从而在cmd中使用fc进行对比，这是一个平凡的字符串处理和bat批处理，代码如下：

#include <stdio.h>

char s[1111]; int tot;

unsigned int data[111111];

inline bool judge(char c)

{

if ('0'<=c && c<='9') return 1;

if ('a'<=c && c<='f') return 1;

return 0;

}

inline unsigned int change(char c)

{

if ('0'<=c && c<='9') return c-'0';

if ('a'<=c && c<='f') return c-'a'+10;

return 0;

}

inline int todigit(int num)

{

int ans;

char s[11];

sprintf(s,"%x",num);

sscanf(s,"%d",&ans);

return ans;

}

int main()

{

freopen("out.txt","w",stdout);

gets(s);

while (gets(s))

{

int rep=1;

unsigned int num=0;

for (int i=0;s[i];i++)

{

if (judge(s[i]))

num=(num<<4)+change(s[i]);

else if (s[i]=='\*')

rep=todigit(num),num=0;

else if (s[i]==' ')

{

for (int j=0;j<rep;j++)

data[tot++]=num;

num=0,rep=1;

}

}

for (int j=0;j<rep;j++)

data[tot++]=num;

}

//printf("%d\n",tot);

for (int i=0;i<tot;i++)

printf("%08x\n",data[i]);

return 0;

}

@echo off

fc out.txt ans.txt

pause

:end

## 三、思考题

### （一）

现在我们的模块中IM使用ROM，DM使用RAM，GRF使用Register，这种做法合理吗？请给出分析，若有改进意见也请一并给出。

我认为合理，ROM是只读存储器，考虑到指令存储器只需要输出指令而不需要写入指令，使用ROM进行存储是合理的。DM用来访问内存中的数据，这需要足够的存储空间且要求支持读写，因此仅RAM可以满足此要求。GRF需要足够快的存储速度，而不需要很大的空间(32\*32)，因此采用寄存器搭建GRF是合理的。

### （二）

事实上，实现nop空指令，我们并不需要将它加入控制信号真值表，为什么？

因为nop指令的编码实质上是特殊的sll指令，即将0号寄存器中的值左移0位后存入0号寄存器，这和什么都没有做没有任何区别，由于此处理器已经完成了对sll指令的支持，我们并不需要将nop空指令加入控制信号真值表。

### （三）

上文提到，MARS不能导出PC与DM起始地址均为0的机器码。实际上，可以通过为DM增添片选信号，来避免手工修改的麻烦，请查阅相关资料进行了解，并阐释为了解决这个问题，你最终采用的方法。

题目可能有误，MARS中，我们选择了“Compact, Data at Address 0”，因此，“可以通过为DM增添片选信号”应为“可以通过为PC增添片选信号”，如上文中所述，我对PC和IM进行了修改，记PC初始化值为A，只要在IM的输入信号输入到ROM前将其减去A，就可以起到PC的起始地址为X的效果，我们可以任意修改X来满足不同的测试要求。

### （四）

除了编写程序进行测试外，还有一种验证CPU设计正确性的办法——形式验证。形式验证的含义是根据某个或某些形式规范或属性，使用数学的方法证明其正确性或非正确性。请搜索“形式验证”了解相关内容后，简要阐述相比于测试，形式验证的优劣之处。

形式验证的优点包括：形式验证是对指定描述的所有可能的情况进行验证，覆盖率达到了100%；形式验证技术是借用数学上的方法将待验证电路和功能描述或参考设计直接进行比较，不需要开发测试激励；形式验证的验证时间短，可以很快发现和改正电路设计中的错误，可以缩短设计周期。形式验证的不足包括无法分析一些动态的特性，无法有效验证电路性能，如电路的功耗和延迟等等。

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middle\_five：

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addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s1,$0,40

addi $s2,$0,0

la $a1,TAG5

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a1,TAG7

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a1,TAG18

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a1,TAG15

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a1,TAG2

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

j AFTER

TAG1:

addi $t1,$0,1

jr $a0

TAG2:

addi $t1,$0,2

jr $a0

TAG3:

addi $t1,$0,3

jr $a0

TAG4:

addi $t1,$0,4

jr $a0

TAG5:

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TAG6:

addi $t1,$0,6

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addi $t1,$0,7

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TAG17:

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TAG18:

addi $t1,$0,18

jr $a0

TAG19:

addi $t1,$0,19

jr $a0

TAG20:

addi $t1,$0,20

jr $a0

AFTER:

la $a0,TAG13

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a0,TAG9

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a0,TAG1

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a0,TAG17

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

la $a0,TAG10

add $t2,$0,$a1

jalr $a0,$t2

sw $t1,0($s2)

addi $s2,$s2,4

addi $s0,$0,0

j LOOP\_BGEIN1

PRINT11:

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

PRINT12:

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

PRINT13:

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

LOOP\_BGEIN1:

beq $s0,$s1,END\_LOOP1

slti $t0,$s0,30

beq $t0,$0,UPPER1

slti $t0,$s0,10

beq $t0,$0,MID1

LOWER1:

jal PRINT11

j OUT1

MID1:

jal PRINT12

j OUT1

UPPER1:

jal PRINT13

j OUT1

OUT1:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEIN1

END\_LOOP1:

addi $s0,$0,0

LOOP\_BGEIN2:

beq $s0,$s1,END\_LOOP2

slti $t0,$s0,30

beq $t0,$0,UPPER2

slti $t0,$s0,10

beq $t0,$0,MID2

LOWER2:

jal PRINT21

j OUT2

MID2:

jal PRINT22

j OUT2

UPPER2:

jal PRINT23

j OUT2

OUT2:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEIN2

END\_LOOP2:

j TEST3

PRINT21:

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

PRINT22:

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

PRINT23:

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

TEST3:

addi $s0,$0,0

LOOP\_BGEIN3:

beq $s0,$s1,END\_LOOP3

slti $t0,$s0,30

j SKIP1

PRINT31:

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

SKIP1:

beq $t0,$0,UPPER3

slti $t0,$s0,10

beq $t0,$0,MID3

LOWER3:

jal PRINT31

j SKIP3

PRINT33:

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

SKIP3:

j OUT3

MID3:

jal PRINT32

j OUT3

UPPER3:

jal PRINT33

j OUT3

OUT3:

sw $s0,0($s2)

addi $s2,$s2,4

j SKIP2

PRINT32:

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $31

SKIP2:

addi $s0,$s0,1

j LOOP\_BGEIN3

END\_LOOP3:

j LOOP\_BGEINN1

PRINTN11:

addi $a0,$31,0

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

PRINTN12:

addi $a0,$31,0

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

PRINTN13:

addi $a0,$31,0

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

addi $s0,$0,0

LOOP\_BGEINN1:

beq $s0,$s1,END\_LOOPN1

slti $t0,$s0,30

beq $t0,$0,UPPERN1

slti $t0,$s0,10

beq $t0,$0,MIDN1

LOWERN1:

jal PRINTN11

j OUTN1

MIDN1:

jal PRINTN12

j OUTN1

UPPERN1:

jal PRINTN13

j OUTN1

OUTN1:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEINN1

END\_LOOPN1:

addi $s0,$0,0

LOOP\_BGEINN2:

beq $s0,$s1,END\_LOOPN2

slti $t0,$s0,30

beq $t0,$0,UPPERN2

slti $t0,$s0,10

beq $t0,$0,MIDN2

LOWERN2:

jal PRINTN21

j OUTN2

MIDN2:

jal PRINTN22

j OUTN2

UPPERN2:

jal PRINTN23

j OUTN2

OUTN2:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEINN2

END\_LOOPN2:

j TESTN3

PRINTN21:

addi $a0,$31,0

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

PRINTN22:

addi $a0,$31,0

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

PRINTN23:

addi $a0,$31,0

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

TESTN3:

addi $s0,$0,0

LOOP\_BGEINN3:

beq $s0,$s1,END\_LOOPN3

slti $t0,$s0,30

j SKIPN1

PRINTN31:

addi $a0,$31,0

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

SKIPN1:

beq $t0,$0,UPPERN3

slti $t0,$s0,10

beq $t0,$0,MIDN3

LOWERN3:

jal PRINTN31

j SKIPN3

PRINTN33:

addi $a0,$31,0

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

SKIPN3:

j OUTN3

MIDN3:

jal PRINTN32

j OUTN3

UPPERN3:

jal PRINTN33

j OUTN3

OUTN3:

sw $s0,0($s2)

addi $s2,$s2,4

j SKIPN2

PRINTN32:

addi $a0,$31,0

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

jr $a0

SKIPN2:

addi $s0,$s0,1

j LOOP\_BGEINN3

END\_LOOPN3:

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4

------------------------------------------------

li $t2,80

sw $t2,0($0)

li $t2,-10

sw $t2,4($0)

li $t2,-9

sw $t2,8($0)

li $t2,-8

sw $t2,12($0)

li $t2,-7

sw $t2,16($0)

li $t2,-6

sw $t2,20($0)

li $t2,-5

sw $t2,24($0)

li $t2,-4

sw $t2,28($0)

li $t2,-3

sw $t2,32($0)

li $t2,-2

sw $t2,36($0)

li $t2,-1

sw $t2,40($0)

li $t2,0

sw $t2,44($0)

li $t2,1

sw $t2,48($0)

li $t2,2

sw $t2,52($0)

li $t2,3

sw $t2,56($0)

li $t2,4

sw $t2,60($0)

li $t2,5

sw $t2,64($0)

li $t2,6

sw $t2,68($0)

li $t2,7

sw $t2,72($0)

li $t2,8

sw $t2,76($0)

li $t2,9

sw $t2,80($0)

li $t2,10

sw $t2,84($0)

#--------------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s0,$0,0

addi $s2,$0,0

addi $s1,$0,40

LOOP\_BGEIN1:

beq $s0,$s1,END\_LOOP1

slti $t0,$s0,30

beq $t0,$0,UPPER1

slti $t0,$s0,10

beq $t0,$0,MID1

LOWER1:

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

j OUT1

MID1:

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

j OUT1

UPPER1:

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

OUT1:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEIN1

END\_LOOP1:

addi $s1,$0,40

addi $s0,$0,0

LOOP\_BGEIN2:

beq $s0,$s1,END\_LOOP2

slti $t0,$s0,10

bne $t0,$0,LOWER2

slti $t0,$s0,30

bne $t0,$0,MID2

UPPER2:

addi $t0,$0,1

sw $t0,0($s2)

addi $s2,$s2,4

j OUT2

MID2:

addi $t0,$0,0

sw $t0,0($s2)

addi $s2,$s2,4

j OUT2

LOWER2:

addi $t0,$0,-1

sw $t0,0($s2)

addi $s2,$s2,4

OUT2:

sw $s0,0($s2)

addi $s2,$s2,4

addi $s0,$s0,1

j LOOP\_BGEIN2

END\_LOOP2:

addi $s0,$0,1

addi $s1,$0,1

beq $s0,$s1,FLASE1

FRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT1

FLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT1:

addi $s0,$0,1

addi $s1,$0,2

beq $s0,$s1,FLASE2

FRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT2

FLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT2:

addi $s0,$0,-1

addi $s1,$0,-1

beq $s0,$s1,FLASE3

FRUE3:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT3

FLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT3:

addi $s0,$0,-2

addi $s1,$0,-3

beq $s0,$s1,FLASE4

FRUE4:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT4

FLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT4:

addi $s0,$0,1

addi $s1,$0,-1

beq $s0,$s1,FLASE5

FRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT5

FLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT5:

addi $s0,$0,-1

addi $s1,$0,1

beq $s0,$s1,FLASE6

FRUE6:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT6

FLASE6:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT6:

addi $s0,$0,0

addi $s1,$0,1

beq $s0,$s1,FLASE7

FRUE7:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT7

FLASE7:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT7:

addi $s0,$0,0

addi $s1,$0,-1

beq $s0,$s1,FLASE8

FRUE8:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT8

FLASE8:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT8:

addi $s0,$0,1

addi $s1,$0,0

beq $s0,$s1,FLASE9

FRUE9:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT9

FLASE9:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT9:

addi $s0,$0,-1

addi $s1,$0,0

beq $s0,$s1,FLASE10

FRUE10:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT10

FLASE10:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT10:

addi $s0,$0,0

addi $s1,$0,0

beq $s0,$s1,FLASE11

FRUE11:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NEXT11

FLASE11:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NEXT11:

#-------------------------------

addi $s0,$0,1

addi $s1,$0,1

bne $s0,$s1,NFLASE1

NFRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT1

NFLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT1:

addi $s0,$0,1

addi $s1,$0,2

bne $s0,$s1,NFLASE2

NFRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT2

NFLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT2:

addi $s0,$0,-1

addi $s1,$0,-1

bne $s0,$s1,NFLASE3

NFRUE3:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT3

NFLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT3:

addi $s0,$0,-2

addi $s1,$0,-3

bne $s0,$s1,NFLASE4

NFRUE4:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT4

NFLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT4:

addi $s0,$0,1

addi $s1,$0,-1

bne $s0,$s1,NFLASE5

NFRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT5

NFLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT5:

addi $s0,$0,-1

addi $s1,$0,1

bne $s0,$s1,NFLASE6

NFRUE6:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT6

NFLASE6:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT6:

addi $s0,$0,0

addi $s1,$0,1

bne $s0,$s1,NFLASE7

NFRUE7:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT7

NFLASE7:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT7:

addi $s0,$0,0

addi $s1,$0,-1

bne $s0,$s1,NFLASE8

NFRUE8:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT8

NFLASE8:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT8:

addi $s0,$0,1

addi $s1,$0,0

bne $s0,$s1,NFLASE9

NFRUE9:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT9

NFLASE9:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT9:

addi $s0,$0,-1

addi $s1,$0,0

bne $s0,$s1,NFLASE10

NFRUE10:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT10

NFLASE10:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT10:

addi $s0,$0,0

addi $s1,$0,0

bne $s0,$s1,NFLASE11

NFRUE11:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j NNEXT11

NFLASE11:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

NNEXT11:

#-------------------------------

addi $s0,$0,1

bgtz $s0,GTFLASE1

GTFRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GTNEXT1

GTFLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GTNEXT1:

addi $s0,$0,-1

bgtz $s0,GTFLASE2

GTFRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GTNEXT2

GTFLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GTNEXT2:

addi $s0,$0,32767

bgtz $s0,GTFLASE3

GTFRUE3:

addi $s0,$0,-32768

sw $s0,0($s2)

addi $s2,$s2,4

j GTNEXT3

GTFLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GTNEXT3:

addi $s0,$0,2315

bgtz $s0,GTFLASE4

GTFRUE4:

addi $s0,$0,-4523

sw $s0,0($s2)

addi $s2,$s2,4

j GTNEXT4

GTFLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GTNEXT4:

addi $s0,$0,0

bgtz $s0,GTFLASE5

GTFRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GTNEXT5

GTFLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GTNEXT5:

#-------------------------------

addi $s0,$0,1

bgez $s0,GEFLASE1

GEFRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GENEXT1

GEFLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GENEXT1:

addi $s0,$0,-1

bgez $s0,GEFLASE2

GEFRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GENEXT2

GEFLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GENEXT2:

addi $s0,$0,32767

bgez $s0,GEFLASE3

GEFRUE3:

addi $s0,$0,-32768

sw $s0,0($s2)

addi $s2,$s2,4

j GENEXT3

GEFLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GENEXT3:

addi $s0,$0,2315

bgez $s0,GEFLASE4

GEFRUE4:

addi $s0,$0,-4523

sw $s0,0($s2)

addi $s2,$s2,4

j GENEXT4

GEFLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GENEXT4:

addi $s0,$0,0

bgez $s0,GEFLASE5

GEFRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j GENEXT5

GEFLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

GENEXT5:

#-------------------------------

addi $s0,$0,1

bltz $s0,LTFLASE1

LTFRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LTNEXT1

LTFLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LTNEXT1:

addi $s0,$0,-1

bltz $s0,LTFLASE2

LTFRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LTNEXT2

LTFLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LTNEXT2:

addi $s0,$0,32767

bltz $s0,LTFLASE3

LTFRUE3:

addi $s0,$0,-32768

sw $s0,0($s2)

addi $s2,$s2,4

j LTNEXT3

LTFLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LTNEXT3:

addi $s0,$0,2315

bltz $s0,LTFLASE4

LTFRUE4:

addi $s0,$0,-4523

sw $s0,0($s2)

addi $s2,$s2,4

j LTNEXT4

LTFLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LTNEXT4:

addi $s0,$0,0

bltz $s0,LTFLASE5

LTFRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LTNEXT5

LTFLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LTNEXT5:

#-------------------------------

addi $s0,$0,1

blez $s0,LEFLASE1

LEFRUE1:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LENEXT1

LEFLASE1:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LENEXT1:

addi $s0,$0,-1

blez $s0,LEFLASE2

LEFRUE2:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LENEXT2

LEFLASE2:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LENEXT2:

addi $s0,$0,32767

blez $s0,LEFLASE3

LEFRUE3:

addi $s0,$0,-32768

sw $s0,0($s2)

addi $s2,$s2,4

j LENEXT3

LEFLASE3:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LENEXT3:

addi $s0,$0,2315

blez $s0,LEFLASE4

LEFRUE4:

addi $s0,$0,-4523

sw $s0,0($s2)

addi $s2,$s2,4

j LENEXT4

LEFLASE4:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LENEXT4:

addi $s0,$0,0

blez $s0,LEFLASE5

LEFRUE5:

addi $s0,$0,1

sw $s0,0($s2)

addi $s2,$s2,4

j LENEXT5

LEFLASE5:

addi $s0,$0,-1

sw $s0,0($s2)

addi $s2,$s2,4

LENEXT5:

addi $t2,$0,2222

sw $t2,0($s2)

addi $s2,$s2,4

addi $t2,$0,3333

sw $t2,0($s2)

addi $s2,$s2,4

addi $t2,$0,4444

sw $t2,0($s2)

addi $s2,$s2,4

------------------------------------------------

li $t2,80

sw $t2,0($0)

li $t2,111

sw $t2,4($0)

li $t2,222

sw $t2,8($0)

li $t2,-2147483648

sw $t2,12($0)

li $t2,-444

sw $t2,16($0)

li $t2,2147483647

sw $t2,20($0)

li $t2,-666

sw $t2,24($0)

li $t2,-1

sw $t2,28($0)

li $t2,1

sw $t2,32($0)

li $t2,0

sw $t2,36($0)

li $t2,0

sw $t2,40($0)

li $t2,2147483647

sw $t2,44($0)

li $t2,0

sw $t2,48($0)

#--------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s0,$0,0

lw $s1,0($s0)

addi $s0,$s0,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4

------------------------------------------------

li $t2,80

sw $t2,0($0)

li $t2,-1

sw $t2,4($0)

li $t2,0

sw $t2,8($0)

li $t2,0

sw $t2,12($0)

li $t2,32564

sw $t2,16($0)

li $t2,0

sw $t2,20($0)

li $t2,-56764

sw $t2,24($0)

li $t2,111

sw $t2,28($0)

li $t2,222

sw $t2,32($0)

li $t2,-333

sw $t2,36($0)

li $t2,-444

sw $t2,40($0)

li $t2,3424232

sw $t2,44($0)

li $t2,-356764

sw $t2,48($0)

li $t2,-1

sw $t2,52($0)

li $t2,1

sw $t2,56($0)

li $t2,0

sw $t2,60($0)

li $t2,0

sw $t2,64($0)

li $t2,2345

sw $t2,68($0)

li $t2,0

sw $t2,72($0)

#--------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s0,$0,0

lw $s1,0($s0)

addi $s0,$s0,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

addu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

subu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

and $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

or $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

slt $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

xor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

nor $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sllv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srlv $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

srav $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sltu $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

#--------------------------------------

lw $t0,0($s0)

addi $s0,$s0,4

lw $t1,0($s0)

addi $s0,$s0,4

add $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

add $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t1

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t0,$t0

sw $t2,0($s1)

addi $s1,$s1,4

sub $t2,$t1,$t1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4

------------------------------------------------

li $t2,80

sw $t2,0($0)

li $t2,-10

sw $t2,4($0)

li $t2,-9

sw $t2,8($0)

li $t2,-8

sw $t2,12($0)

li $t2,-7

sw $t2,16($0)

li $t2,-6

sw $t2,20($0)

li $t2,-5

sw $t2,24($0)

li $t2,-4

sw $t2,28($0)

li $t2,-3

sw $t2,32($0)

li $t2,-2

sw $t2,36($0)

li $t2,-1

sw $t2,40($0)

li $t2,0

sw $t2,44($0)

li $t2,1

sw $t2,48($0)

li $t2,2

sw $t2,52($0)

li $t2,3

sw $t2,56($0)

li $t2,4

sw $t2,60($0)

li $t2,5

sw $t2,64($0)

li $t2,6

sw $t2,68($0)

li $t2,7

sw $t2,72($0)

li $t2,8

sw $t2,76($0)

li $t2,9

sw $t2,80($0)

li $t2,10

sw $t2,84($0)

li $t2,2147483647

sw $t2,88($0)

li $t2,-2147483648

sw $t2,92($0)

#-----------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s0,$0,100

addi $s2,$0,0

addi $s1,$0,96

LOOP\_BEGIN1:

beq $s2,$s1,END\_LOOP1

lw $t0,0($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGIN1

END\_LOOP1:

addi $s2,$0,0

addi $s1,$0,96

LOOP\_BEGIN2:

beq $s2,$s1,END\_LOOP2

lh $t0,0($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGIN2

END\_LOOP2:

addi $s2,$0,0

addi $s1,$0,96

LOOP\_BEGIN3:

beq $s2,$s1,END\_LOOP3

lhu $t0,0($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGIN3

END\_LOOP3:

addi $s2,$0,0

addi $s1,$0,96

LOOP\_BEGIN4:

beq $s2,$s1,END\_LOOP4

lb $t0,0($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGIN4

END\_LOOP4:

addi $s2,$0,0

addi $s1,$0,96

LOOP\_BEGIN5:

beq $s2,$s1,END\_LOOP5

lbu $t0,0($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGIN5

END\_LOOP5:

addi $s2,$0,4

addi $s1,$0,96

LOOP\_BEGINA1:

beq $s2,$s1,END\_LOOPA1

lw $t0,-4($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGINA1

END\_LOOPA1:

addi $s2,$0,6

addi $s1,$0,96

LOOP\_BEGINA2:

beq $s2,$s1,END\_LOOPA2

lh $t0,-6($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGINA2

END\_LOOPA2:

addi $s2,$0,2

addi $s1,$0,96

LOOP\_BEGINA3:

beq $s2,$s1,END\_LOOPA3

lhu $t0,-2($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGINA3

END\_LOOPA3:

addi $s2,$0,5

addi $s1,$0,96

LOOP\_BEGINA4:

beq $s2,$s1,END\_LOOPA4

lb $t0,-5($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGINA4

END\_LOOPA4:

addi $s2,$0,3

addi $s1,$0,96

LOOP\_BEGINA5:

beq $s2,$s1,END\_LOOPA5

lbu $t0,-3($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGINA5

END\_LOOPA5:

addi $s2,$0,-4

addi $s1,$0,96

LOOP\_BEGINS1:

beq $s2,$s1,END\_LOOPS1

lw $t0,4($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGINS1

END\_LOOPS1:

addi $s2,$0,-6

addi $s1,$0,96

LOOP\_BEGINS2:

beq $s2,$s1,END\_LOOPS2

lh $t0,6($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGINS2

END\_LOOPS2:

addi $s2,$0,-2

addi $s1,$0,96

LOOP\_BEGINS3:

beq $s2,$s1,END\_LOOPS3

lhu $t0,2($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,2

j LOOP\_BEGINS3

END\_LOOPS3:

addi $s2,$0,-5

addi $s1,$0,96

LOOP\_BEGINS4:

beq $s2,$s1,END\_LOOPS4

lb $t0,5($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGINS4

END\_LOOPS4:

addi $s2,$0,-3

addi $s1,$0,96

LOOP\_BEGINS5:

beq $s2,$s1,END\_LOOPS5

lbu $t0,3($s2)

sw $t0,0($s0)

addi $s0,$s0,4

addi $s2,$s2,1

j LOOP\_BEGINS5

END\_LOOPS5:

#-----------------------------------------

addi $s2,$0,0

addi $s1,$0,96

addi $s0,$s0,8

LOOP\_BEGIN6:

beq $s2,$s1,END\_LOOP6

lw $t0,0($s2)

sw $t0,-4($s0)

addi $s0,$s0,4

sw $t0,0($s0)

addi $s0,$s0,4

sw $t0,4($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGIN6

END\_LOOP6:

addi $s2,$0,0

addi $s1,$0,96

addi $s0,$s0,8

LOOP\_BEGIN7:

beq $s2,$s1,END\_LOOP7

lw $t0,0($s2)

sh $t0,-6($s0)

addi $s0,$s0,4

sh $t0,-4($s0)

addi $s0,$s0,4

sh $t0,-2($s0)

addi $s0,$s0,4

sh $t0,0($s0)

addi $s0,$s0,4

sh $t0,2($s0)

addi $s0,$s0,4

sh $t0,4($s0)

addi $s0,$s0,4

sh $t0,6($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGIN7

END\_LOOP7:

addi $s2,$0,0

addi $s1,$0,96

addi $s0,$s0,8

LOOP\_BEGIN8:

beq $s2,$s1,END\_LOOP8

lw $t0,0($s2)

sb $t0,-5($s0)

addi $s0,$s0,4

sb $t0,-4($s0)

addi $s0,$s0,4

sb $t0,-3($s0)

addi $s0,$s0,4

sb $t0,-2($s0)

addi $s0,$s0,4

sb $t0,-1($s0)

addi $s0,$s0,4

sb $t0,0($s0)

addi $s0,$s0,4

sb $t0,1($s0)

addi $s0,$s0,4

sb $t0,2($s0)

addi $s0,$s0,4

sb $t0,3($s0)

addi $s0,$s0,4

sb $t0,4($s0)

addi $s0,$s0,4

sb $t0,5($s0)

addi $s0,$s0,4

addi $s2,$s2,4

j LOOP\_BEGIN8

END\_LOOP8:

addi $t2,$0,2222

sw $t2,0($s0)

addi $s0,$s0,4

addi $t2,$0,3333

sw $t2,0($s0)

addi $s0,$s0,4

addi $t2,$0,4444

sw $t2,0($s0)

addi $s0,$s0,4

------------------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s1,$0,0

addi $t1,$0,0

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

andi $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,0

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

ori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,-1

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

addiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

addiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

addiu $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,-1

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sll $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sll $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sll $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,-1

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

srl $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

srl $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

srl $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4

------------------------------------------------

addi $1,$1,23333

addi $2,$2,23333

addi $3,$3,23333

addi $4,$4,23333

addi $5,$5,23333

addi $6,$6,23333

addi $7,$7,23333

addi $8,$8,23333

addi $9,$9,23333

addi $10,$10,23333

addi $11,$11,23333

addi $12,$12,23333

addi $13,$13,23333

addi $14,$14,23333

addi $15,$15,23333

addi $16,$16,23333

addi $17,$17,23333

addi $18,$18,23333

addi $19,$19,23333

addi $20,$20,23333

addi $21,$21,23333

addi $22,$22,23333

addi $23,$23,23333

addi $24,$24,23333

addi $25,$25,23333

addi $26,$26,23333

addi $27,$27,23333

addi $28,$28,23333

addi $29,$29,23333

addi $30,$30,23333

addi $31,$31,23333

addi $s1,$0,0

addi $t1,$0,0

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,2147483647

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,-2147483648

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,134325

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

xori $t2,$t1,-52435523

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,0

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

slti $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,0

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,134325

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,-1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,32767

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,-32768

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,13432

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-52435523

sltiu $t2,$t1,-5243

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t1,$0,-1

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sra $t2,$t1,0

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sra $t2,$t1,1

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-1

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,0

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,1

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-32453245

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,24535436

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,2147483647

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

addi $t1,$0,-2147483648

sra $t2,$t1,8

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

lui $t2,0

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,1

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,4365

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,3647

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,648

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,15

sw $t2,0($s1)

addi $s1,$s1,4

lui $t2,1243

sw $t2,0($s1)

addi $s1,$s1,4

#-----------------------------------------

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4

------------------------------------------------

j MAIN

SOLVE:

addi $t0,$t0,1

addi $t1,$0,0

addi $t2,$0,0

addi $a1,$0,0

LOOPSI0\_BEGIN:

slt $a0,$a1,$s0

beq $a0,$0,END\_LOOPSI0

add $t2,$t2,$s0

addi $a1,$a1,1

j LOOPSI0\_BEGIN

END\_LOOPSI0:

addi $a1,$0,0

LOOPSI1\_BEGIN:

slt $a0,$a1,$s0

beq $a0,$0,END\_LOOPSI1

add $t1,$t1,$t2

addi $a1,$a1,1

j LOOPSI1\_BEGIN

END\_LOOPSI1:

addi $t2,$0,0

addi $a1,$0,0

LOOPSJ0\_BEGIN:

slt $a0,$a1,$s1

beq $a0,$0,END\_LOOPSJ0

add $t2,$t2,$s1

addi $a1,$a1,1

j LOOPSJ0\_BEGIN

END\_LOOPSJ0:

addi $a1,$0,0

LOOPSJ1\_BEGIN:

slt $a0,$a1,$s1

beq $a0,$0,END\_LOOPSJ1

add $t1,$t1,$t2

addi $a1,$a1,1

j LOOPSJ1\_BEGIN

END\_LOOPSJ1:

addi $t2,$0,0

addi $a1,$0,0

LOOPSK0\_BEGIN:

slt $a0,$a1,$s2

beq $a0,$0,END\_LOOPSK0

add $t2,$t2,$s2

addi $a1,$a1,1

j LOOPSK0\_BEGIN

END\_LOOPSK0:

addi $a1,$0,0

LOOPSK1\_BEGIN:

slt $a0,$a1,$s2

beq $a0,$0,END\_LOOPSK1

add $t1,$t1,$t2

addi $a1,$a1,1

j LOOPSK1\_BEGIN

END\_LOOPSK1:

beq $t0,$t1,PRINT

jr $31

PRINT:

sw $t1,0($a2)

addi $a2,$a2,4

jr $31

MAIN:

addi $s0,$0,1

addi $t0,$t0,99

LOOPI\_BEGIN:

slti $a0,$s0,10

beq $a0,$0,END\_LOOPI

addi $s1,$0,0

LOOPJ\_BEGIN:

slti $a0,$s1,10

beq $a0,$0,END\_LOOPJ

addi $s2,$0,0

LOOPK\_BEGIN:

slti $a0,$s2,10

beq $a0,$0,END\_LOOPK

jal SOLVE

addi $s2,$s2,1

j LOOPK\_BEGIN

END\_LOOPK:

addi $s1,$s1,1

j LOOPJ\_BEGIN

END\_LOOPJ:

addi $s0,$s0,1

j LOOPI\_BEGIN

END\_LOOPI:

------------------------------------------------

.data

array: .space 440

.text

li $t2,50

sw $t2,0($0)

li $t2,49

sw $t2,4($0)

li $t2,48

sw $t2,8($0)

li $t2,47

sw $t2,12($0)

li $t2,46

sw $t2,16($0)

li $t2,45

sw $t2,20($0)

li $t2,44

sw $t2,24($0)

li $t2,43

sw $t2,28($0)

li $t2,42

sw $t2,32($0)

li $t2,41

sw $t2,36($0)

li $t2,40

sw $t2,40($0)

li $t2,39

sw $t2,44($0)

li $t2,38

sw $t2,48($0)

li $t2,37

sw $t2,52($0)

li $t2,36

sw $t2,56($0)

li $t2,35

sw $t2,60($0)

li $t2,34

sw $t2,64($0)

li $t2,33

sw $t2,68($0)

li $t2,32

sw $t2,72($0)

li $t2,31

sw $t2,76($0)

li $t2,30

sw $t2,80($0)

li $t2,29

sw $t2,84($0)

li $t2,28

sw $t2,88($0)

li $t2,27

sw $t2,92($0)

li $t2,26

sw $t2,96($0)

li $t2,25

sw $t2,100($0)

li $t2,24

sw $t2,104($0)

li $t2,23

sw $t2,108($0)

li $t2,22

sw $t2,112($0)

li $t2,21

sw $t2,116($0)

li $t2,20

sw $t2,120($0)

li $t2,19

sw $t2,124($0)

li $t2,18

sw $t2,128($0)

li $t2,17

sw $t2,132($0)

li $t2,16

sw $t2,136($0)

li $t2,15

sw $t2,140($0)

li $t2,14

sw $t2,144($0)

li $t2,13

sw $t2,148($0)

li $t2,12

sw $t2,152($0)

li $t2,11

sw $t2,156($0)

li $t2,10

sw $t2,160($0)

li $t2,9

sw $t2,164($0)

li $t2,8

sw $t2,168($0)

li $t2,7

sw $t2,172($0)

li $t2,6

sw $t2,176($0)

li $t2,5

sw $t2,180($0)

li $t2,4

sw $t2,184($0)

li $t2,3

sw $t2,188($0)

li $t2,2

sw $t2,192($0)

li $t2,1

sw $t2,196($0)

li $t2,100

sw $t2,200($0)

li $t2,99

sw $t2,204($0)

li $t2,98

sw $t2,208($0)

li $t2,97

sw $t2,212($0)

li $t2,96

sw $t2,216($0)

li $t2,95

sw $t2,220($0)

li $t2,94

sw $t2,224($0)

li $t2,93

sw $t2,228($0)

li $t2,92

sw $t2,232($0)

li $t2,91

sw $t2,236($0)

li $t2,90

sw $t2,240($0)

li $t2,89

sw $t2,244($0)

li $t2,88

sw $t2,248($0)

li $t2,87

sw $t2,252($0)

li $t2,86

sw $t2,256($0)

li $t2,85

sw $t2,260($0)

li $t2,84

sw $t2,264($0)

li $t2,83

sw $t2,268($0)

li $t2,82

sw $t2,272($0)

li $t2,81

sw $t2,276($0)

li $t2,80

sw $t2,280($0)

li $t2,79

sw $t2,284($0)

li $t2,78

sw $t2,288($0)

li $t2,77

sw $t2,292($0)

li $t2,76

sw $t2,296($0)

li $t2,75

sw $t2,300($0)

li $t2,74

sw $t2,304($0)

li $t2,73

sw $t2,308($0)

li $t2,72

sw $t2,312($0)

li $t2,71

sw $t2,316($0)

li $t2,70

sw $t2,320($0)

li $t2,69

sw $t2,324($0)

li $t2,68

sw $t2,328($0)

li $t2,67

sw $t2,332($0)

li $t2,66

sw $t2,336($0)

li $t2,65

sw $t2,340($0)

li $t2,64

sw $t2,344($0)

li $t2,63

sw $t2,348($0)

li $t2,62

sw $t2,352($0)

li $t2,61

sw $t2,356($0)

li $t2,60

sw $t2,360($0)

li $t2,59

sw $t2,364($0)

li $t2,58

sw $t2,368($0)

li $t2,57

sw $t2,372($0)

li $t2,56

sw $t2,376($0)

li $t2,55

sw $t2,380($0)

li $t2,54

sw $t2,384($0)

li $t2,53

sw $t2,388($0)

li $t2,52

sw $t2,392($0)

li $t2,51

sw $t2,396($0)

#-----------------------

li $29,12284

li $s0,100

li $s1,0

subi $s2,$s0,1

jal QSORT

j ENDED

QSORT:

sub $t0,$s1,$s2

bgez $t0,BACK

add $s3,$s1,$s2

srl $s3,$s3,1

#-------------------------------

sll $a0,$s1,2

lw $t1,array($a0)

sll $a0,$s2,2

lw $t2,array($a0)

sub $t0,$t1,$t2

bgtz $t0,SWAPLR

j AFTERSWAPLR

SWAPLR:

sll $a0,$s1,2

sw $t2,array($a0)

sll $a0,$s2,2

sw $t1,array($a0)

AFTERSWAPLR:

#-------------------------------

sll $a0,$s3,2

lw $t1,array($a0)

sll $a0,$s2,2

lw $t2,array($a0)

sub $t0,$t1,$t2

bgtz $t0,SWAPRMID

j AFTERSWAPRMID

SWAPRMID:

sll $a0,$s3,2

sw $t2,array($a0)

sll $a0,$s2,2

sw $t1,array($a0)

AFTERSWAPRMID:

#-------------------------------

sll $a0,$s3,2

lw $t1,array($a0)

sll $a0,$s1,2

lw $t2,array($a0)

sub $t0,$t1,$t2

bgtz $t0,SWAPLMID

j AFTERSWAPLMID

SWAPLMID:

sll $a0,$s3,2

sw $t2,array($a0)

sll $a0,$s1,2

sw $t1,array($a0)

AFTERSWAPLMID:

#-------------------------------

move $t4,$s1

move $t5,$s2

sll $a0,$s1,2

lw $t6,array($a0)

#-------------------------------

OUT\_WHILE\_BEGIN:

beq $t4,$t5,OUT\_WHILE\_END

WHILE\_J\_BEGIN:

sll $a0,$t5,2

lw $t0,array($a0)

sub $t1,$t0,$t6

bgez $t1,JMAY\_RIGHT

j WHILE\_J\_END

JMAY\_RIGHT:

sub $t1,$t4,$t5

bltz $t1,JIS\_RIGHT

j WHILE\_J\_END

JIS\_RIGHT:

subi $t5,$t5,1

j WHILE\_J\_BEGIN

WHILE\_J\_END:

#---------------------------------

WHILE\_I\_BEGIN:

sll $a0,$t4,2

lw $t0,array($a0)

sub $t1,$t0,$t6

blez $t1,IMAY\_RIGHT

j WHILE\_I\_END

IMAY\_RIGHT:

sub $t1,$t4,$t5

bltz $t1,IIS\_RIGHT

j WHILE\_I\_END

IIS\_RIGHT:

addi $t4,$t4,1

j WHILE\_I\_BEGIN

WHILE\_I\_END:

#---------------------------------

sub $t1,$t4,$t5

bltz $t1,TO\_SWAP

j OUT\_WHILE\_BEGIN

TO\_SWAP:

sll $a0,$t4,2

lw $t0,array($a0)

sll $a0,$t5,2

lw $t1,array($a0)

sll $a0,$t4,2

sw $t1,array($a0)

sll $a0,$t5,2

sw $t0,array($a0)

j OUT\_WHILE\_BEGIN

OUT\_WHILE\_END:

sll $a0,$t4,2

lw $t0,array($a0)

sll $a0,$s1,2

sw $t0,array($a0)

sll $a0,$t4,2

sw $t6,array($a0)

move $s3,$t4

move $t5,$t4

#-------------------------------

WHILE\_SUBI\_BEGIN:

sub $t0,$t4,$s1

bltz $t0,WHILE\_SUBI\_END

sll $a0,$t4,2

lw $t0,array($a0)

sll $a0,$s3,2

lw $t1,array($a0)

bne $t0,$t1,WHILE\_SUBI\_END

subi $t4,$t4,1

j WHILE\_SUBI\_BEGIN

WHILE\_SUBI\_END:

WHILE\_ADDJ\_BEGIN:

sub $t0,$t5,$s2

bgtz $t0,WHILE\_ADDJ\_END

sll $a0,$t5,2

lw $t0,array($a0)

sll $a0,$s3,2

lw $t1,array($a0)

bne $t0,$t1,WHILE\_ADDJ\_END

addi $t5,$t5,1

j WHILE\_ADDJ\_BEGIN

WHILE\_ADDJ\_END:

#-------------------------------

sw $31,0($sp)

subi $sp,$sp,4

sw $t5,0($sp)

subi $sp,$sp,4

sw $s2,0($sp)

subi $sp,$sp,4

move $s2,$t4

jal QSORT

addi $sp,$sp,4

lw $s2,0($sp)

addi $sp,$sp,4

lw $t5,0($sp)

addi $sp,$sp,4

lw $31,0($sp)

#-------------------------------

sw $31,0($sp)

subi $sp,$sp,4

move $s1,$t5

jal QSORT

addi $sp,$sp,4

lw $31,0($sp)

BACK:

jr $31

ENDED:

li $s1,400

addi $t2,$0,2222

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,3333

sw $t2,0($s1)

addi $s1,$s1,4

addi $t2,$0,4444

sw $t2,0($s1)

addi $s1,$s1,4