**Ram Design**

This document explains how to design the RAM random access memory.

Identical method is for the design of ROM read only memory.

Open new directory calls it Ram\_X or another name as your whish’s.

Load in this directory the file Ram\_X\_data.mif which is the file.mif you have in our examples.

Just change the name.

Open Quartus

Click on FILE

On the drop-down MENU click: NEW PROJECT WIZARD

Window with the name: INTRUDUCTION is open.

Click NEXT

What is the working directory – on the right side of this line there are three dotes?

Select the directory Ram\_X

Open window

On the line directory, name, top level entity on the first white space

Ram\_X

What is the name of this project type?

Ram\_X

What is the name of top-level design?

Ram\_X

Click next.

Project type do nothing click next.

Add file do nothing click next.

Family device and board

Chose MAX10 family, Roll to choose 10M50DAF484C7G.

Click next.

Ada tools do nothing click next.

Click FINISH.

Now on the open Quartus prime (the upper roller) click on tools.

Chose IP CATALOG (or you see it already on the right side of the screen)

Library

Basic functions

On chip memory

Click Ram 1 port.

Save IP variation.

On the widow project …. /Ram\_X/Ram\_X (add again Ram\_X)

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Chose VHDL

Click on OK

A window with drawing of the IP is opened.

Select how wide should ‘q’ output: select 8 bits.

How many 8 bits words: select 64.

Single clock

Click next.

Chose to create ‘rden’ - read enable signal.

Click next.

Use this file for memory content: click on BROWSE.

Go to directory Ram\_X (if you are not already in this directory)

File name

Press on down arrow.

A drop-down menu is opened.

Chose MIF files - (\*.mif)

The file Ram\_X\_data.mif appear on the screen.

On the screen double click on Ram\_X\_data.mif

This name appears on the white space.

../Ram\_X\_data.mif

Click next.

Click next.

Select all files.

Ram\_x.inc

Ram\_X.cmp

Ram\_X.bsf

Ram\_X.inst

Click finish.

On Quartus prime IP files Select yes.

Select compile.

After compilation Select the file Rom\_X.bsf.

Add the line: NUM\_PARALELL PROCESSORS 4

Copy the file \*.sdc from our examples and change the name to Ram\_X.sdc.

Compile again.

You will get file completed ok with three warnings which we can accept.

The file Ram\_X.cmp is a block that we can read with the help of a state machine as we discuss.

And by simulation.

Verify that the q values are the same as those in the mif.