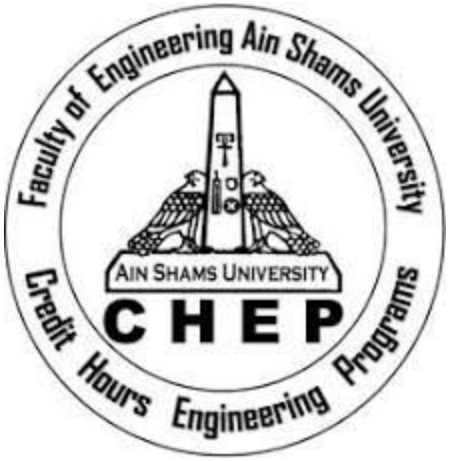

CSE 215
Project 3

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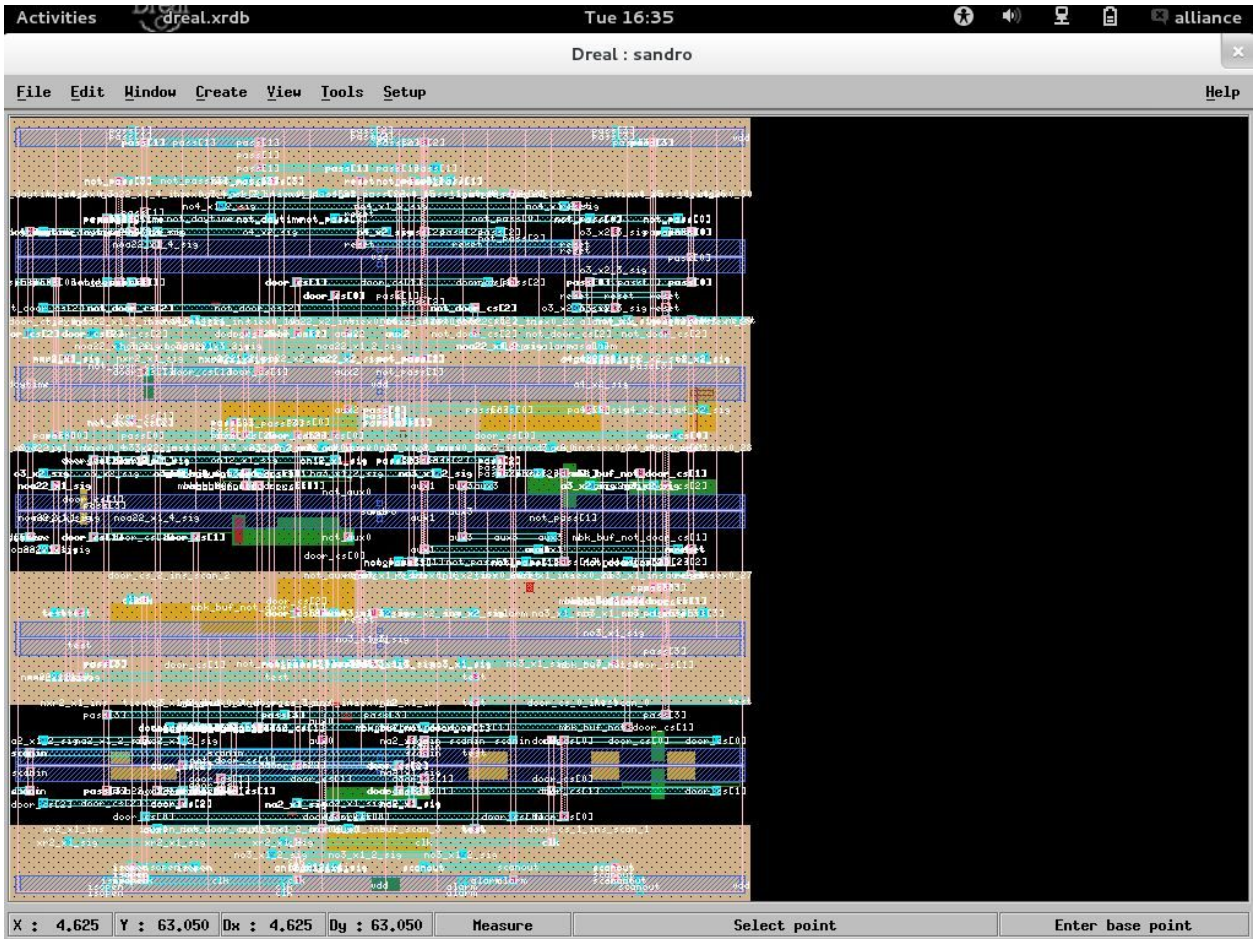
Department:
CSE Junior

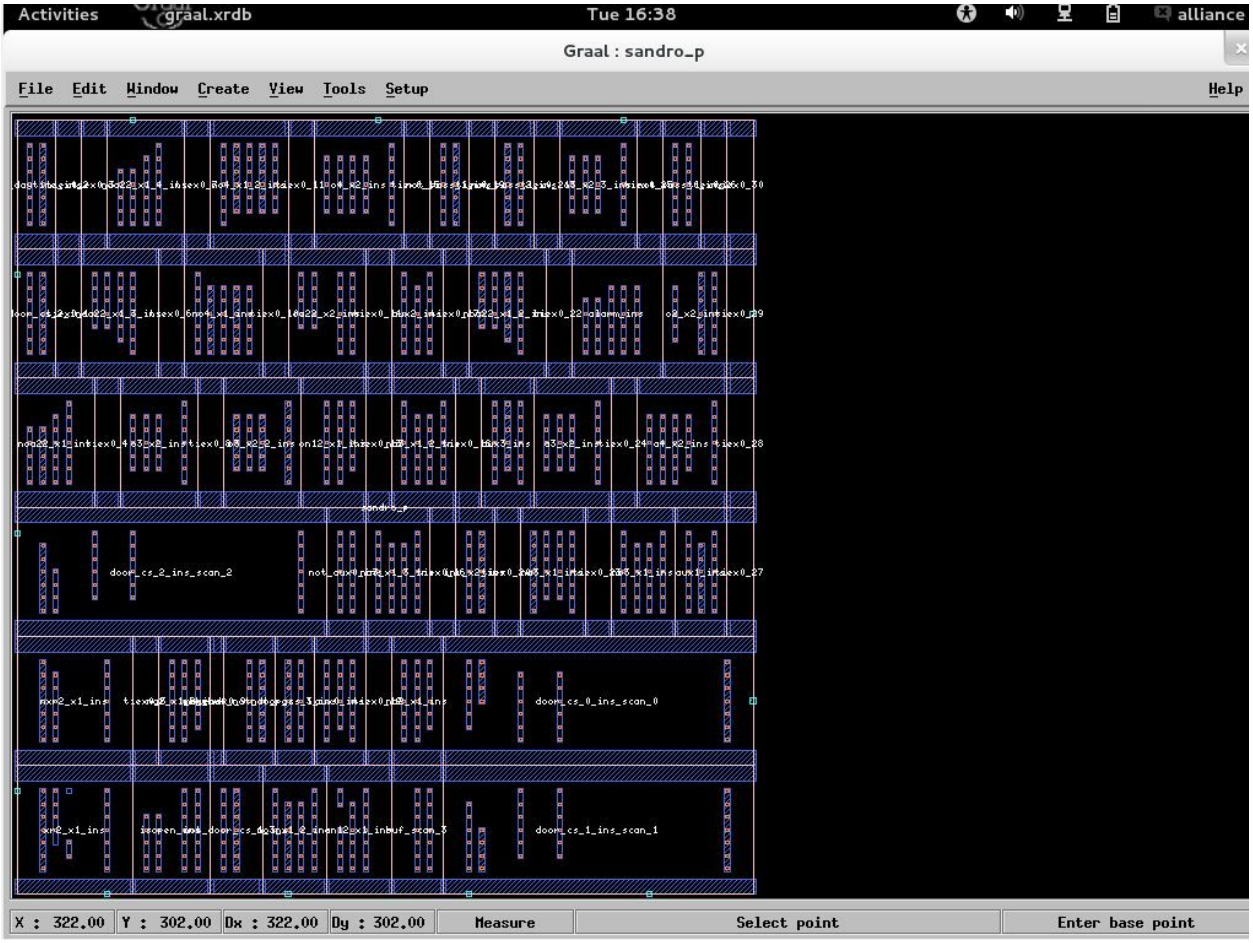
1) Introduction :

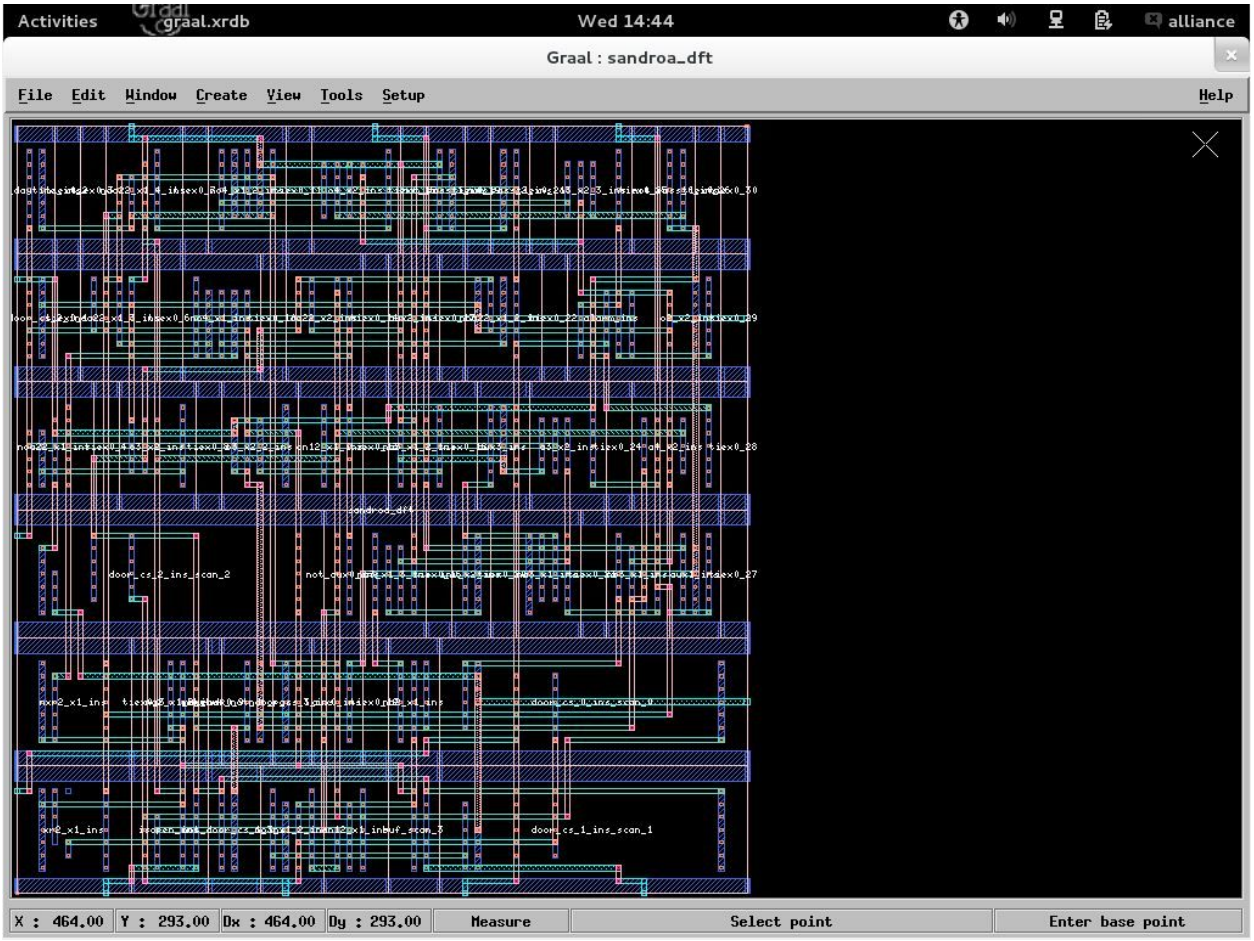
In this project, i’ll perform physical synthesis of the RTL design of Project 1

2) Physical implementation of the chip

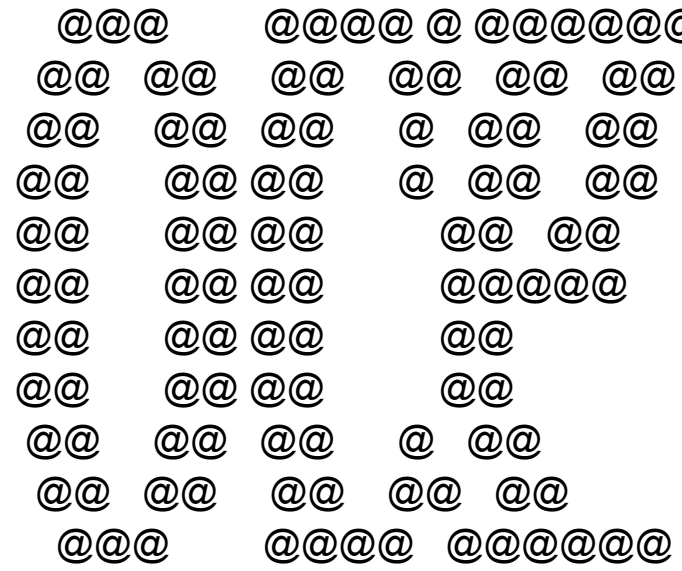
a) Outputs :




Activities
graal.xrdb
Tue 16:38
alliance
Graal : sandro_p
File
Edit
Window
Create
View
Tools
Setup
Help
doom_cs_2_ins_scan_2
doom_cs_0_ins_scan_0
doom_cs_1_ins_scan_1
X : 322.00
Y : 302.00
Dx : 322.00
Dy : 302.00
Measure
Select point
Enter base point


Activities
graal.xrdb
Wed 14:44
alliance
Graal : sandroa_dft
File
Edit
Window
Create
View
Tools
Setup
Help
X : 464.00
Y : 293.00
Dx : 464.00
Dy : 293.00
Measure
Select point
Enter base point

b) ocp.out :



Placer for Standards Cells

Alliance CAD System 5.0 20090901, ocp 5.0
Copyright (c) 2001-2019, ASIM/LIP6/UPMC
E-mail : alliance-users@asim.lip6.fr

o ALLIANCE environment:
  o ALLIANCE_TOP : /usr/lib64/alliance
o MBK environment:
  o MBK_IN_LO : vst
  o MBK_OUT_LO : vst
  o MBK_IN_PH : ap
  o MBK_OUT_PH : ap
  o MBK_VSS : vss
  o MBK_VDD : vdd
  o MBK_CATAL_NAME : CATAL
  o MBK_CATA_LIB : .
    /usr/lib64/alliance/cells/sxlib

/usr/lib64/alliance/cells/dp_sxlib
/usr/lib64/alliance/cells/rflib
/usr/lib64/alliance/cells/rf2lib
/usr/lib64/alliance/cells/ramlib
/usr/lib64/alliance/cells/romlib
/usr/lib64/alliance/cells/pxlib
/usr/lib64/alliance/cells/padlib

o Number total of instances is 45
o Number of instances to place is 45
o Number of instances already placed is 0
o Number of nets is 54
o Sum of instances to place widths is ... 283
o Computing Initial Placement ...
o User Margin : 20%
o Number of Rows : 6
o Real Margin : 17.2515%
o Width of the abutment box : 57
o Height of the abutment box : 60
o conspace : 19 1st connector : 9.5
o adding connector : pass 1 x : 9 y : 60
o adding connector : pass 2 x : 28 y : 60
o adding connector : pass 3 x : 47 y : 60
o conspace : 14.25 1st connector : 7.125
o adding connector : isopen x : 7 y : 0
o adding connector : clk x : 21 y : 0
o adding connector : alarm x : 35 y : 0
o adding connector : scanout x : 49 y : 0
o adding connector : scanin x : 0 y : 8
o adding connector : daytime x : 0 y : 28
o adding connector : pass 0 x : 0 y : 48
o adding connector: test x : 57 y : 15
o adding connector: reset x : 57 y : 45

o Initial Placement Computing ... done.
o Beginning global placement ....
o Initial RowCost = 11.3333
o Initial BinCost = 11.3333
o Initial NetCost = 2883
o Initial Cost = 1
o Computing Initial Temperature ...
o bins size 283
o bins capa 283
o subrows capa 283
Loop = 1, Temperature = 0.210576, Cost = 1.0392
RowCost = 47, BinCost = 47, NetCost = 2996
Success Ratio = 98.9873%, Dist = 1, Delta = 0.5
o Total impossible movements = 741
o 0 % suroccupied target
o 35.0877 % source equal target
o 64.9123 % impossible exchange
Loop = 2, Temperature = 0.105288, Cost = 1.00312
RowCost = 51, BinCost = 51, NetCost = 2892
Success Ratio = 97.5949%, Dist = 1, Delta = 0.5
o Total impossible movements = 1365
o 0 % suroccupied target
o 36.9963 % source equal target
o 63.0037 % impossible exchange
Loop = 3, Temperature = 0.0526439, Cost = 1.00694
RowCost = 37, BinCost = 37, NetCost = 2903
Success Ratio = 95.9494%, Dist = 1, Delta = 0.5
o Total impossible movements = 1987
o 0 % suroccupied target
o 38.148 % source equal target
o 61.852 % impossible exchange
Loop = 4, Temperature = 0.026322, Cost = 1.06452
RowCost = 49, BinCost = 49, NetCost = 3069

Success Ratio = 91.8987%, Dist = 1, Delta = 0.5
o Total impossible movements = 2659
o 0 % suroccupied target
o 37.5705 % source equal target
o 62.4295 % impossible exchange
Loop = 5, Temperature = 0.0151542, Cost = 0.989247
RowCost = 45, BinCost = 45, NetCost = 2852
Success Ratio = 81.519%, Dist = 1, Delta = 0.575724
o Total impossible movements = 3329
o 0 % suroccupied target
o 36.5575 % source equal target
o 63.4425 % impossible exchange
Loop = 6, Temperature = 0.0101756, Cost = 1.03677
RowCost = 39, BinCost = 39, NetCost = 2989
Success Ratio = 68.7342%, Dist = 1, Delta = 0.671474
o Total impossible movements = 4048
o 0 % suroccupied target
o 36.3883 % source equal target
o 63.6117 % impossible exchange
Loop = 7, Temperature = 0.0080408, Cost = 0.963926
RowCost = 53, BinCost = 53, NetCost = 2779
Success Ratio = 59.1139%, Dist = 1, Delta = 0.790201
o Total impossible movements = 4655
o 0 % suroccupied target
o 36.4769 % source equal target
o 63.5231 % impossible exchange
Loop = 8, Temperature = 0.00671102, Cost = 0.849462
RowCost = 43, BinCost = 43, NetCost = 2449
Success Ratio = 48.481%, Dist = 1, Delta = 0.834621
o Total impossible movements = 5212
o 0 % suroccupied target
o 36.3392 % source equal target
o 63.6608 % impossible exchange

Loop = 9, Temperature = 0.00565593, Cost = 0.928894
  RowCost = 51, BinCost = 51, NetCost = 2678
  Success Ratio = 39.7468%, Dist = 0.957468, Delta = 0.842783
 o Total impossible movements = 5823
 o 0 % suroccupied target
 o 36.8367 % source equal target
 o 63.1633 % impossible exchange
Loop = 10, Temperature = 0.00467539, Cost = 0.882761
  RowCost = 55, BinCost = 55, NetCost = 2545
  Success Ratio = 39.2405%, Dist = 0.911898, Delta = 0.826634
 o Total impossible movements = 6422
 o 0 % suroccupied target
 o 36.7798 % source equal target
 o 63.2202 % impossible exchange
Loop = 11, Temperature = 0.00360976, Cost = 0.847381
  RowCost = 43, BinCost = 43, NetCost = 2443
  Success Ratio = 25.9494%, Dist = 0.747294, Delta = 0.772078
 o Total impossible movements = 7043
 o 0 % suroccupied target
 o 36.6605 % source equal target
 o 63.3395 % impossible exchange
Loop = 12, Temperature = 0.00306711, Cost = 0.82761
  RowCost = 44.6667, BinCost = 44.6667, NetCost = 2386
  Success Ratio = 22.5316%, Dist = 0.586863, Delta = 0.849672
 o Total impossible movements = 7737
 o 0 % suroccupied target
 o 36.5387 % source equal target
 o 63.4613 % impossible exchange
Loop = 13, Temperature = 0.00265977, Cost = 0.8564

RowCost = 33, BinCost = 33, NetCost = 2469
Success Ratio = 21.2658%, Dist = 0.453444, Delta = 0.867189
o Total impossible movements = 8400
o 0 % suroccupied target
o 36.8452 % source equal target
o 63.1548 % impossible exchange
Loop = 14, Temperature = 0.00213997, Cost = 0.833507
RowCost = 43, BinCost = 43, NetCost = 2403
Success Ratio = 21.3924%, Dist = 0.350931, Delta = 0.804572
o Total impossible movements = 9087
o 0 % suroccupied target
o 37.174 % source equal target
o 62.826 % impossible exchange
Loop = 15, Temperature = 0.00194887, Cost = 0.767603
RowCost = 41, BinCost = 41, NetCost = 2213
Success Ratio = 13.7975%, Dist = 0.244941, Delta = 0.910696
o Total impossible movements = 9837
o 0 % suroccupied target
o 38.0502 % source equal target
o 61.9498 % impossible exchange
Loop = 16, Temperature = 0.00179323, Cost = 0.757197
RowCost = 39, BinCost = 39, NetCost = 2183
Success Ratio = 19.4937%, Dist = 0.184915, Delta = 0.920138
o Total impossible movements = 11039
o 0 % suroccupied target
o 40.3479 % source equal target
o 59.6521 % impossible exchange
Loop = 17, Temperature = 0.00156727, Cost = 0.776622
RowCost = 31, BinCost = 31, NetCost = 2239

Success Ratio = 10.5063%, Dist = 0.12298, Delta = 0.873994
o Total impossible movements = 12336
o 0 % suroccupied target
o 42.2909 % source equal target
o 57.7091 % impossible exchange
Loop = 18, Temperature = 0.00136936, Cost = 0.757197
RowCost = 37, BinCost = 37, NetCost = 2183
Success Ratio = 10%, Dist = 0.1, Delta = 0.873722
o Total impossible movements = 13424
o 0 % suroccupied target
o 43.817 % source equal target
o 56.183 % impossible exchange
Loop = 19, Temperature = 0.00122536, Cost = 0.764135
RowCost = 29, BinCost = 29, NetCost = 2203
Success Ratio = 8.10127%, Dist = 0.1, Delta = 0.894844
o Total impossible movements = 14699
o 0 % suroccupied target
o 45.1119 % source equal target
o 54.8881 % impossible exchange
Loop = 20, Temperature = 0.00107424, Cost = 0.764135
RowCost = 25, BinCost = 25, NetCost = 2203
Success Ratio = 10.6329%, Dist = 0.1, Delta = 0.876674
o Total impossible movements = 15751
o 0 % suroccupied target
o 46.1368 % source equal target
o 53.8632 % impossible exchange
Loop = 21, Temperature = 0.000779364, Cost = 0.757197
RowCost = 33, BinCost = 33, NetCost = 2183
Success Ratio = 5.82278%, Dist = 0.1, Delta = 0.725501
o Total impossible movements = 16958
o 0 % suroccupied target
o 46.8805 % source equal target
o 53.1195 % impossible exchange

Loop = 22, Temperature = 0.000389682, Cost = 0.757197
RowCost = 33, BinCost = 33, NetCost = 2183
Success Ratio = 2.91139%, Dist = 0.1, Delta = 0.5
o Total impossible movements = 18077
o 0 % suroccupied target
o 47.6517 % source equal target
o 52.3483 % impossible exchange
Loop = 23, Temperature = 0.000194841, Cost = 0.757197
RowCost = 33.3333, BinCost = 33.3333, NetCost = 2183
Success Ratio = 2.78481%, Dist = 0.1, Delta = 0.5
o Total impossible movements = 19333
o 0 % suroccupied target
o 48.2957 % source equal target
o 51.7043 % impossible exchange
o Global Placement finished .....
o Gain for RowCost = -191.176%
o Gain for BinCost = -191.176%
o Gain for NetCost = 24.2803%
o NetCost Estimated = 2183
o Movements Stats ?!
o 19005 Tried Moves
o 0.115759 % of accepted simple instance move
o 37.4796 % of accepted instance exchange
o 0.047356 % of rejected simple instance move
o 62.3573 % of rejected instance exchange
o Impossible Movements Stats ....
o If you find these values interesting, call a doctor...
o Total impossible movements = 20539
o 0 % suroccupied target
o 48.7122 % source equal target
o 51.2878 % impossible exchange
o Final Optimization in process ...
o Net Cost before Final Optimization... 2354

o Final Optimization succeeded ...
o Final Net Cost 1720
o Final Net Cost Optimization 26.9329%
o Total Net Optimization 40.3399%

Ocp : placement finished
NO PREPLACEMENT GIVEN
o Destruction of DATABASE ....

c) nero.out :

```
          @@@  @@@     @@@@@@@
          @@   @       @@ @@
          @@@  @       @@  @@
          @ @@ @  @@@@@  @@  @@  @@@
          @ @@ @ @  @ @@ @@  @@ @@
          @ @@ @ @@  @@ @@@@@  @@
@@
          @  @@ @ @@@@@@@@@@ @@ @@
@@   @@
          @  @@ @ @@    @@ @@ @@  @@
          @  @@@ @@   @ @@ @@ @@  @@
          @   @@ @@  @@ @@  @@ @@ @@
          @@@  @@  @@@@ @@@@@ @@@
@@@
```

Negotiating Router

Alliance CAD System 5.0 20090901, nero 5.0
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E-mail : alliance-users@asim.lip6.fr

S/N 20080611.1

o MBK environment :

```
MBK_IN_LO      := vst
MBK_OUT_LO     := vst
MBK_IN_PH      := ap
MBK_OUT_PH     := ap
```

```
MBK_WORK_LIB    := .
MBK_CATA_LIB    := .
                   /usr/lib64/alliance/cells/sxlib
                   /usr/lib64/alliance/cells/dp_sxlib
                   /usr/lib64/alliance/cells/rflib
                   /usr/lib64/alliance/cells/rf2lib
                   /usr/lib64/alliance/cells/ramlib
                   /usr/lib64/alliance/cells/romlib
                   /usr/lib64/alliance/cells/pxlib
                   /usr/lib64/alliance/cells/padlib
MBK_CATAL_NAME  := CATAL
MBK_VDD         := vdd
MBK_VSS         := vss
MBK_SEPAR       := .
```

- Loading netlist "sandroa_dft"...
- Loading layout "sandro_p"...
- Flattening layout...
- Flattening netlist...
- Building netlist dual representation (lofigchain)...
- Binding logical & physical views...

- Loading design into grid...
  - Using seed cell "a3_x2_ins" (model "a3_x2").
  - Grid offset : (0,0) [adjust (0,0)]
  - Small design, global routing disabled.
  - Allocating grid size [58,61,3].
  - Loading external terminals.
  - Finding obstacles.
  - Loading nets into grid.
  - Allocating the net scheduler.
  - Reading power grid.

o Local routing stage.

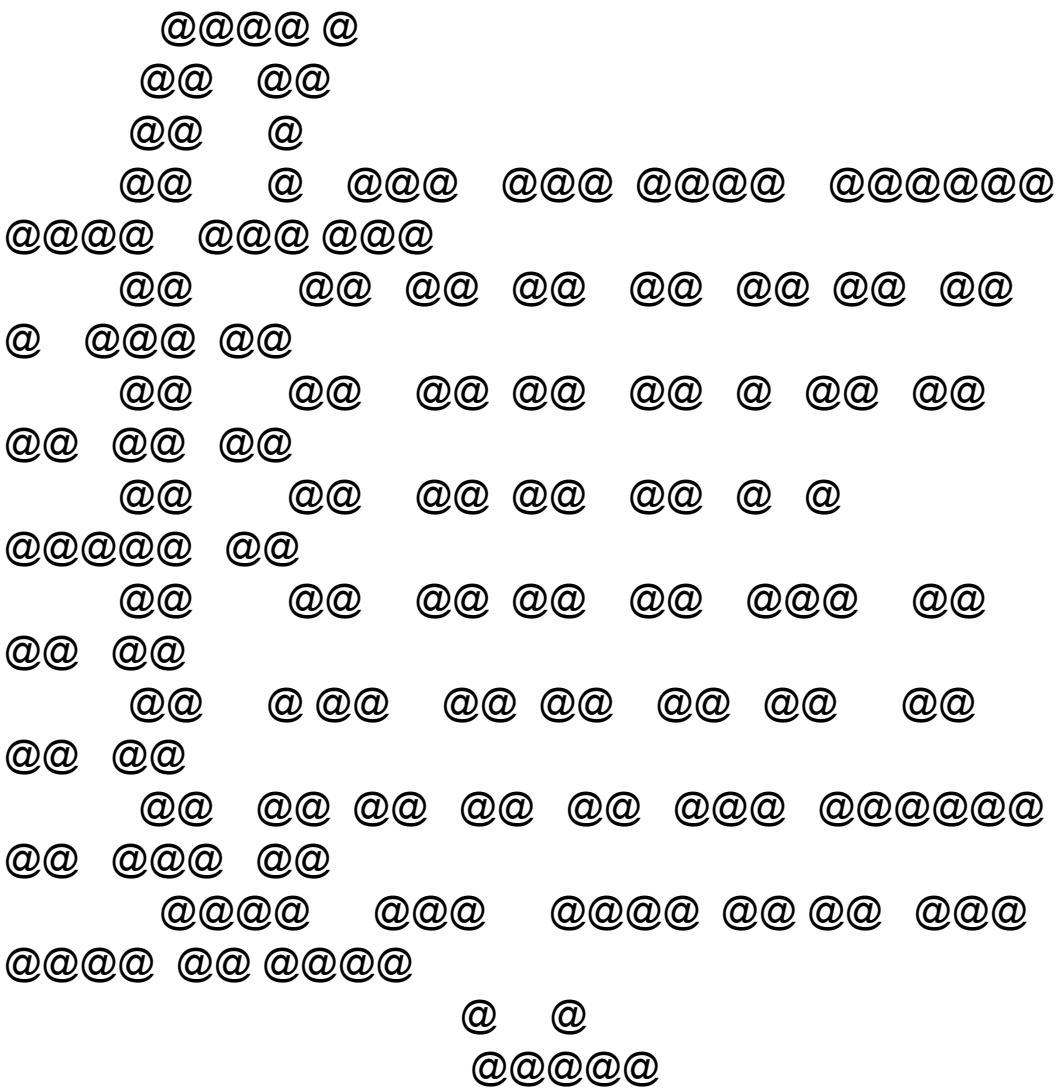
- [55] (hp := 0) "vdd"
- [54] (hp := 0) "vss"
- [53] (hp := 8) "an12_x1_sig"
- [52] (hp := 11) "a3_x2_sig"
- [51] (hp := 13) "inv_x2_sig"
- [50] (hp := 13) "noa22_x1_3_sig"
- [49] (hp := 13) "na3_x1_sig"
- [48] (hp := 13) "o2_x2_sig"
- [47] (hp := 14) "oa22_x2_sig"
- [46] (hp := 15) "isopen"
- [45] (hp := 16) "noa22_x1_sig"
- [44] (hp := 17) "o3_x2_sig"
- [43] (hp := 17) "na2_x1_2_sig"
- [42] (hp := 18) "no3_x1_3_sig"
- [41] (hp := 19) "o3_x2_3_sig"
- [40] (hp := 20) "on12_x1_sig"
- [39] (hp := 20) "na3_x1_2_sig"
- [38] (hp := 20) "not_door_cs 1"
- [37] (hp := 21) "no3_x1_2_sig"
- [36] (hp := 22) "aux2"
- [35] (hp := 23) "aux3"
- [34] (hp := 23) "a4_x2_sig"
- [33] (hp := 24) "not_daytime"
- [32] (hp := 24) "xr2_x1_sig"
- [31] (hp := 24) "o4_x2_sig"
- [30] (hp := 25) "scanout"
- [29] (hp := 25) "na2_x1_sig"
- [28] (hp := 26) "o3_x2_2_sig"
- [27] (hp := 27) "no3_x1_sig"
- [26] (hp := 28) "noa22_x1_2_sig"
- [25] (hp := 31) "daytime"
- [24] (hp := 33) "no4_x1_2_sig"

- [23] (hp :=   33) "not_pass 0"
- [22] (hp :=   34) "not_aux0"
- [21] (hp :=   35) "aux1"
- [20] (hp :=   38) "not_pass 2"
- [19] (hp :=   40) "no4_x1_sig"
- [18] (hp :=   41) "pass 2"
- [17] (hp :=   41) "aux0"
- [16] (hp :=   48) "scanin"
- [15] (hp :=   49) "nxr2_x1_sig"
- [14] (hp :=   49) "not_pass 1"
- [13] (hp :=   52) "pass 1"
- [12] (hp :=   57) "mbk_buf_not_door_cs 1"
- [11] (hp :=   58) "noa22_x1_4_sig"
- [10] (hp :=   58) "alarm"
- [9] (hp :=   61) "clk"
- [8] (hp :=   64) "not_pass 3"
- [7] (hp :=   75) "not_door_cs 2"
- [6] (hp :=   76) "door_cs 2"
- [5] (hp :=   76) "reset"
- [4] (hp :=   77) "test"
- [3] (hp :=   79) "pass 0"
- [2] (hp :=   91) "door_cs 0"
- [1] (hp :=   95) "door_cs 1"
- [0] (hp :=   105) "pass 3"

o Routing stats :
  - routing iterations   := 46044
  - re-routing iterations := 0
  - ratio   := 0%.

o Dumping routing grid.
o Saving MBK figure "sandroa_dft".
o Saving layout as "sandroa_dft"...

d) Cougar_sandroa_dft.out :



Netlist extractor ... formerly Lynx

Alliance CAD System 5.0 20090901, cougar 1.21
Copyright (c) 1998-2019, ASIM/LIP6/UPMC
Author(s): Ludovic Jacomme and Gregoire Avot
Contributor(s): Picault Stephane
E-mail : alliance-users@asim.lip6.fr

```
---> Parse technological file ./techno/techno-035.rds

        RDS_LAMBDA        = 24
        RDS_UNIT          = 80
        RDS_PHYSICAL_GRID = 2
        MBK_SCALE_X       = 100

---> Extract symbolic figure sandroa_dft

      ---> Translate Mbk -> Rds

      ---> Build windows
      <--- 100

      ---> Rectangles    : 1501
      ---> Figure size   : (   -116,   -116 )
                           (  28616,  30116 )

      ---> Cut transistors
      <--- 0
      ---> Build equis
      <--- 61
      ---> Delete windows
      ---> Build signals
      <--- 61
      ---> Build instances
      <--- 75
      ---> Build transistors
      <--- 0
      ---> Save netlist
<--- done !
---> Total extracted capacitance
<--- 0.0pF
```

e) druc_core.out :

```
        @@@@@@@  @@@@@@@
@@@@ @
         @@ @@  @@ @@       @@  @@
         @@  @@  @@  @@      @@   @
         @@  @@ @@  @@ @@@ @@@@ @@
@
         @@  @@ @@ @@  @@  @@ @@
         @@  @@ @@@@@  @@  @@ @@
         @@  @@ @@ @@  @@  @@ @@
         @@  @@ @@ @@  @@  @@ @@
         @@  @@  @@ @@  @@  @@  @@
@
         @@ @@  @@  @@ @@ @@@  @@
@@
        @@@@@@@  @@@@@ @@@ @@@@
@@  @@@@
```

Design Rule Checker

Alliance CAD System 5.0 20090901, druc 5.0
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E-mail : alliance-users@asim.lip6.fr

Flatten DRC on: sandroa_dft
Delete MBK figure : sandroa_dft
Load Flatten Rules : ./techno/techno-symb.rds

Unify : sandroa_dft

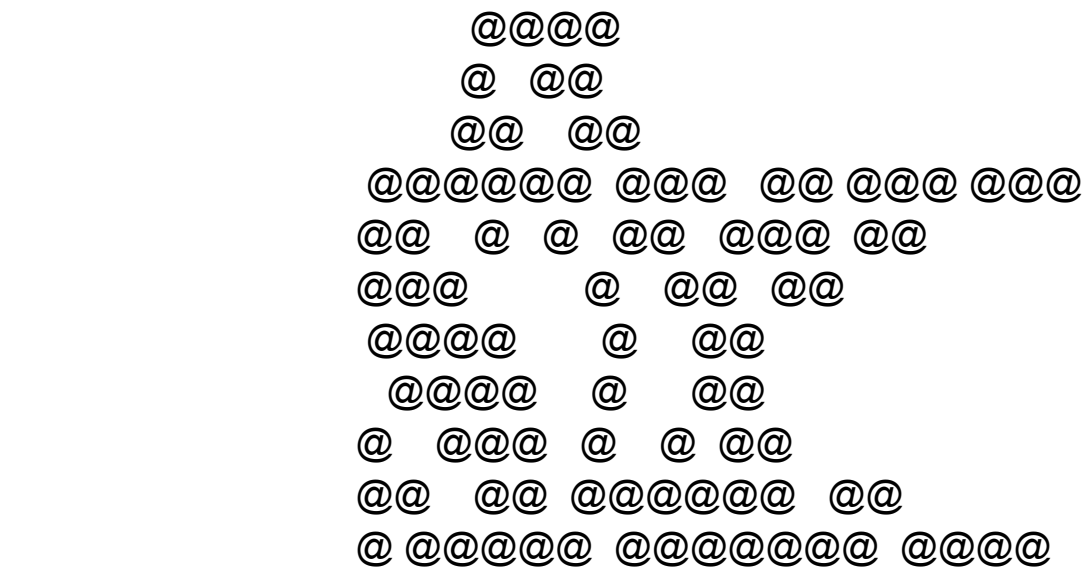
Create Ring : sandroa_dft_rng

Merge Errorfiles:

Merge Error Instances:
instructionCourante : 000 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
End DRC on: sandroa_dft
Saving the Error file figure
Done
6746

Some errors have been detected, see file: sandroa_dft.drc for detailled

f) s2r.out :



Symbolic to Real layout converter

Alliance CAD System 5.0 20090901, s2r 5.0
Copyright (c) 2002-2019, ASIM/LIP6/UPMC
E-mail : alliance-users@asim.lip6.fr

o loading technology file : ./techno/techno-035.rds
o loading all level of symbolic layout : sandroa_dft
o removing symbolic data structure
o layout post-treating
with top connectors,
with sub connectors,
with signal names,
without scotch.
--> post-treating model buf_x2
rectangle merging :
. RDS_NWELL .....

. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model no3_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model xr2_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model inv_x4
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....

--> post-treating model ao22_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model sff2_x4
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model an12_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model nxr2_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....

. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model no2_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model na2_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model inv_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model na3_x1
rectangle merging :
. RDS_NWELL .....

. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model a4_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model o3_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model a3_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....

--> post-treating model noa22_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model on12_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model no4_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model o2_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....

. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model oa22_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model nao2o22_x1
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model o4_x2
rectangle merging :
. RDS_NWELL .....
. RDS_PWELL .....
. RDS_NIMP .....
. RDS_PIMP .....
. RDS_ACTIV .....
. RDS_POLY .....
. RDS_ALU1 .....
--> post-treating model tie_x0
rectangle merging :
. RDS_NWELL .....

```
    . RDS_PWELL .....
    . RDS_NIMP .....
    . RDS_PIMP .....
    . RDS_ACTIV .....
    . RDS_ALU1 .....
--> post-treating model rowend_x0
    rectangle merging :
    . RDS_NWELL .....
    . RDS_ALU1 .....
--> post-treating model sandroa_dft
    ring flattenning  :
    . RDS_NWELL .....
    . RDS_NIMP .....
    . RDS_PIMP .....
    . RDS_ACTIV .....
    . RDS_POLY .....
    rectangle merging :
    . RDS_NWELL .....
    . RDS_NIMP .....
    . RDS_PIMP .....
    . RDS_ACTIV .....
    . RDS_POLY .....
    . RDS_ALU1 .....
    . RDS_ALU2 .....
    . RDS_ALU3 .....
o saving sandroa_dft.cif
o memory allocation informations
--> required rectangles = 2009  really allocated = 7
--> Number of allocated bytes: 386957
```

3) Appendices:

a) Makefile:

```
#-------Project1----------------------------------------#
Syf: sandroj.vbe \
        sandrom.vbe \
        sandroo.vbe \
        sandror.vbe \
        sandroa.vbe
            @echo "<-- Generated SYF"

Boom: sandroj_b.vbe \
        sandrom_b.vbe \
        sandroo_b.vbe \
        sandror_b.vbe \
        sandroa_b.vbe
            @echo "<-- Generated BOOM"

Boog: sandroj_b.vst \
        sandrom_b.vst \
        sandroo_b.vst \
        sandror_b.vst \
        sandroa_b.vst
            @echo "<-- Generated BOOG"

Loon: sandroj_b_l.vst \
        sandrom_b_l.vst \
        sandroo_b_l.vst \
        sandror_b_l.vst \
        sandroa_b_l.vst
            @echo "<-- Generated LOON"
```

```
flatbeh: sandroj_b_l_net.vbe
		@echo "<-- Generated FLATBEH and PROOF"


dft: sandroj_dft.vst
		@echo "<-- Generated DFT"


#-------Finite State Machine Synthesis-----------------#

vhd_to_fsm:
	rename .vhd .fsm *.vhd

sandroa.vbe: sandro.fsm
	@echo "    Encoding Synthesis -> sandro.vbe"
	syf -CEV -a sandro

sandroj.vbe: sandro.fsm
	@echo "    Encoding Synthesis  -> sandroj.vbe"
	syf -CEV -j sandro

sandrom.vbe: sandro.fsm
	@echo "    Encoding Synthesis  -> sandrom.vbe"
	syf -CEV -m sandro

sandroo.vbe: sandro.fsm
	@echo "    Encoding Synthesis  -> sandroo.vbe"
	syf -CEV -o sandro

sandror.vbe: sandro.fsm
	@echo "    Encoding Synthesis  -> sandror.vbe"
	syf -CEV -r sandro
```

```
%_b.vbe: %.vbe
	@echo "    Boolean Optimization  -> $@"
	boom -V -d 50 $* $*_b>$*_boom.out

%.vst: %.vbe paramfile.lax
	@echo "    Logical Synthesis  -> $@"
	boog -x 1 -l paramfile $*>$*_boog.out

%_l.vst: %.vbe paramfile.lax
	@echo "    Netlist Optimization  -> $@"
	loon -x 1 -l paramfile $* $*_l > $*_loon.out

%_b_l_net.vbe: %_b_l.vst %.vbe
	@echo "    Formal checking  -> $@"
	flatbeh $*_b_l $*_b_l_net > $*_flatbeh.out
	proof -d $* $*_b_l_net > $*_proof.out

sandroa_dft.vst : sandroa_b_l.vst  sandroa_dft.vst
	@echo "    DFT  -> $@"
	scapin -VRB sandroa_b_l path sandroa_dft>
sandroa_DFT.out

sandro_p.ap : core_pin_order.ioc sandroa_dft.vst
	MBK_IN_LO=vst ;export MBK_IN_LO ;\
	MBK_OUT_PH=ap ;export MBK_OUT_PH ;\
	ocp -v -ring -ioc core_pin_order sandroa_dft sandro_p >
ocp.out

sandroa_dft.ap : sandro_p.ap sandroa_dft.vst
	nero -V -p sandro_p sandroa_dft sandroa_dft > nero.out

%.al : %.ap
	MBK_OUT_LO=al; export MBK_OUT_LO ;\
```

```
        RDS_TECHNO_NAME=./techno/techno-035.rds ;\
        export RDS_TECHNO_NAME ;\
        cougar -v $* > cougar_$*.out
        lvx vst al $* $* -f > lvx _$*.out

druc_core : sandroa_dft.ap
        RDS_TECHNO_NAME=./techno/techno-symb.rds ;\
        export RDS_TECHNO_NAME ;\
        druc sandroa_dft > druc_core.out

sandro_chip.cif : sandroa_dft.ap
        RDS_TECHNO_NAME=./techno/techno-035.rds ;\
        export RDS_TECHNO_NAME ;\
        RDS_OUT=cif; export RDS_OUT ;\
        s2r -v -r sandroa_dft > s2r.out

#-------Clean Up----------------------------------------#

clean :
        rm -f  *.vbe *.enc *~
        @echo "Erase all the files generated by the makefile"
```

b) Core_pin_order.ioc :

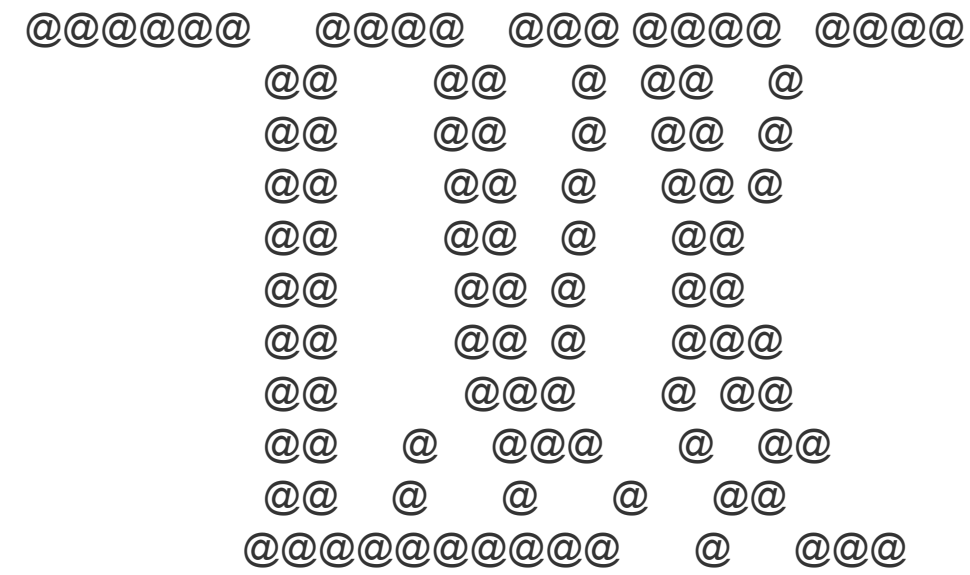
```
LEFT (# IOs from bottom to top
(IOPIN scanin.0 );
(IOPIN daytime.0 );
(IOPIN pass(0).0 ); )

TOP ( # IOs from left to right
(IOPIN pass(1).0 );
(IOPIN  pass(2).0 );
(IOPIN pass(3).0 ); )

RIGHT( # IOs from bottom to top
(IOPIN test.0 );
(IOPIN reset.0 ); )

BOTTOM ( # IOs from left to right
(IOPIN isopen.0 );
(IOPIN clk.0 );
(IOPIN alarm.0 );
(IOPIN scanout.0 ); )
```

c) Lvx :



Gate Netlist Comparator

Alliance CAD System 5.0 20090901, lvx 1.4
Copyright (c) 1992-2019, ASIM/LIP6/UPMC
E-mail : alliance-users@asim.lip6.fr

***** Loading and flattening sandroa_dft (vst)...

***** Loading and flattening sandroa_dft (al)...
***** Invalid parameter '_sandroa_dft.out'

***** Compare Terminals .....
***** O.K. (0 sec)

***** Compare Instances .....
***** O.K. (0 sec)

***** Compare Connections .....
***** O.K. (0 sec)

===== Terminals 14
===== Instances 45
===== Connectors 259

***** Netlists are Identical. ***** (0 sec)