fstaH usage

Ming/DMD.LDF

2019

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Outline

- fstaH introduction
- fstaH option
- fstaH scenario
- setup.ftc.fsta

fstaH introduction

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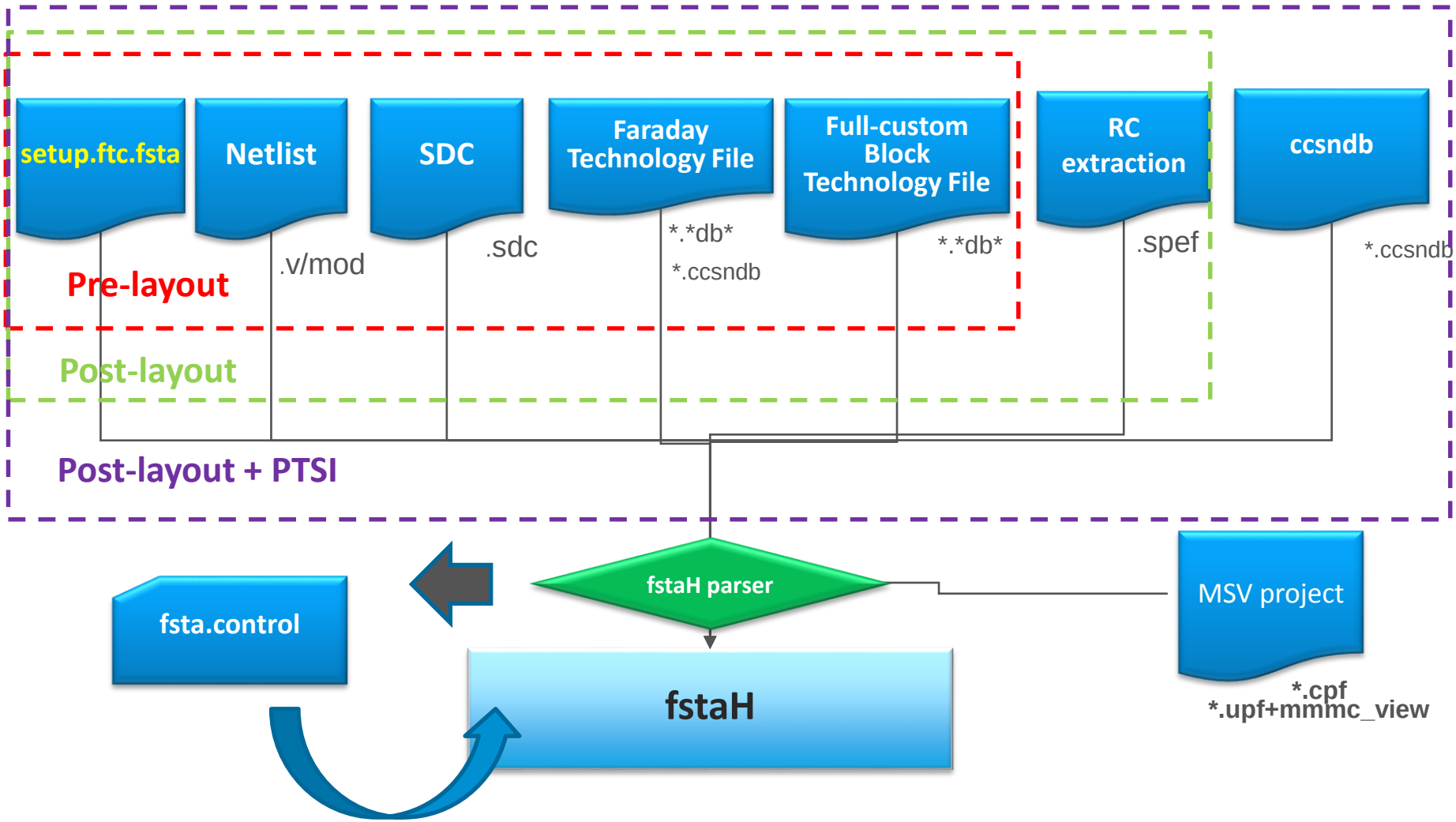
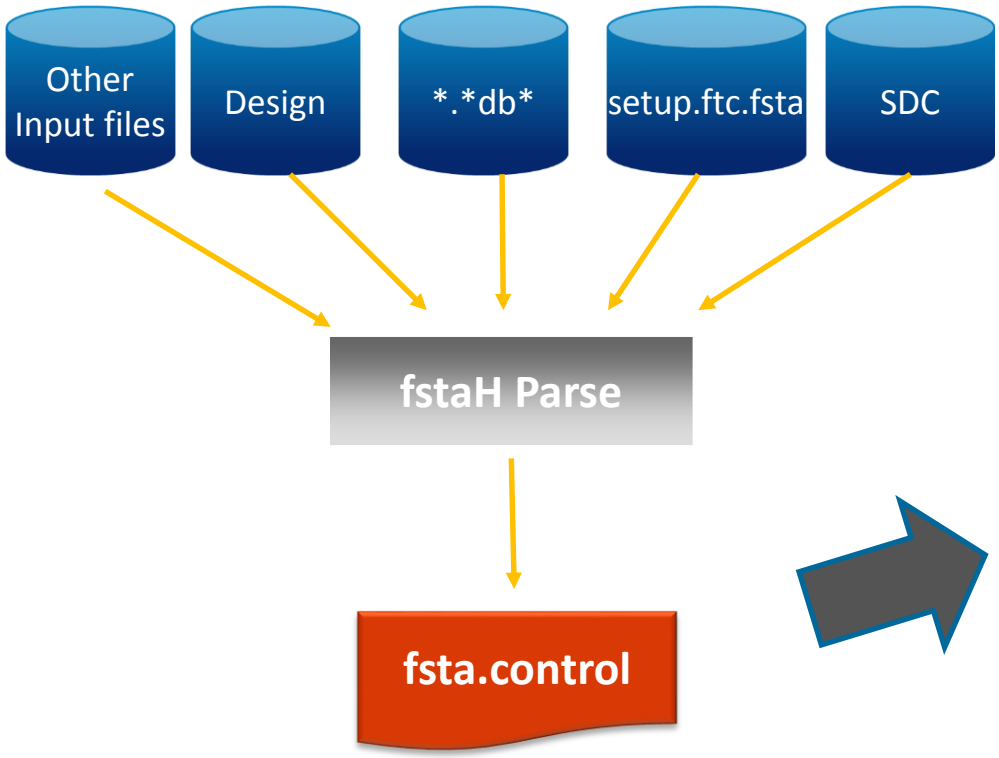
Basic Setting - Input Files



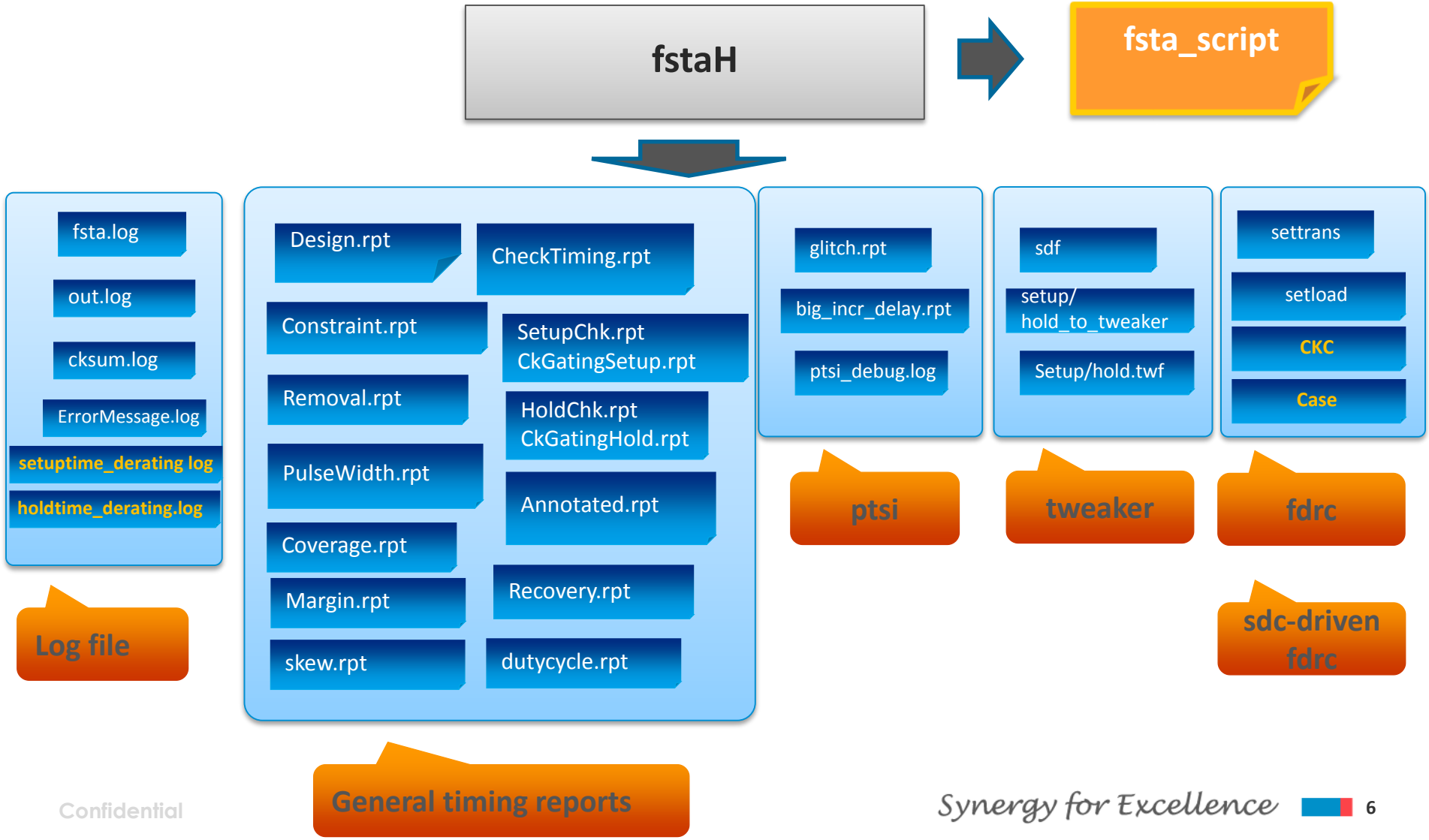
Basic Setting - “fsta.control”



Check your input files setting for each scenario

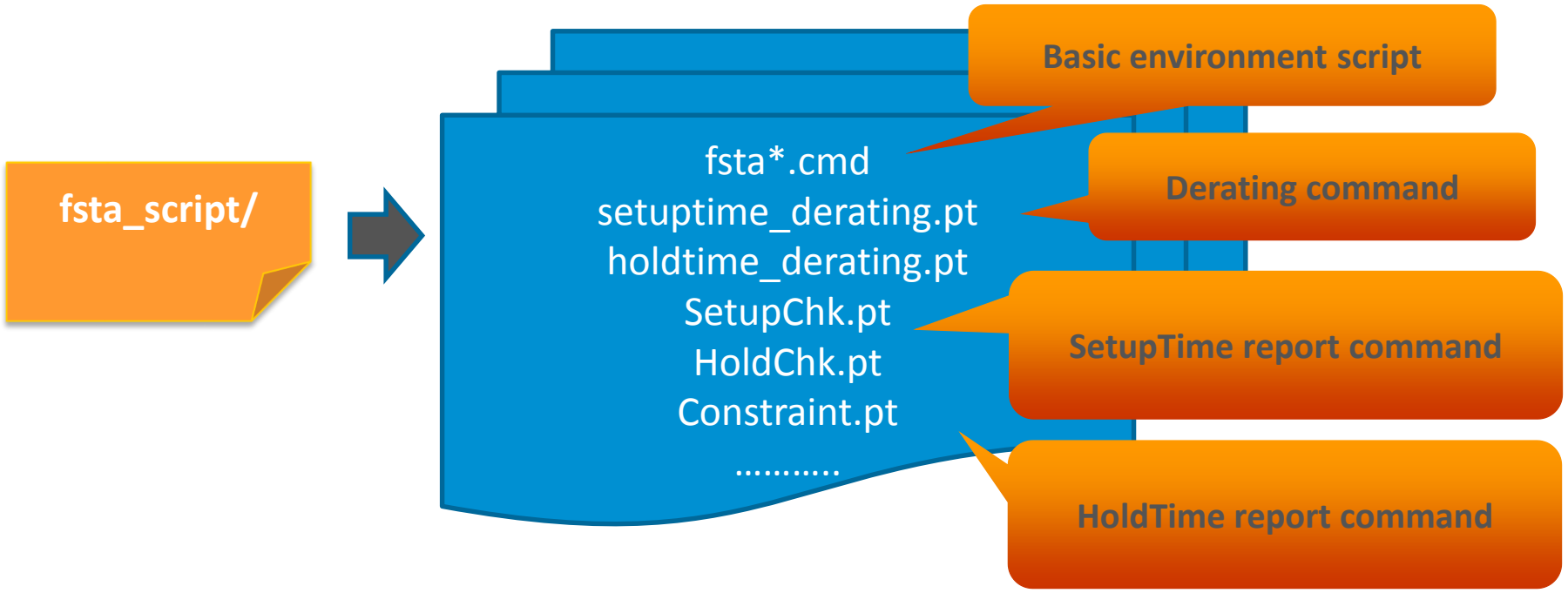
```
NETLIST = FZOTG266HF0F.v
TOP = FZOTG266HF0F

[CORNER_BEGIN]
STA_TIMING_LIB = tt1p2v125c_typ
SDC = FZOTG266HF0F.sdc
CORE_LIB = fsf0f_ehs_core_tt1p2v125c.ccdb
MACRO_LIB = FZOTG266HF0F_A_TT1P2V125C.db
ETM_LIB =
SPEF_TOP = FZOTG266HF0F_typ125c.spef.gz
SPEF_BLOCKS =
INCR_SDF_TOP =
SDF =
[CORNER_END]
```

Basic Setting - Output Files



Basic Setting - fsta_script

- fstaH will output execution scripts in *rpts/fsta_script folder



fstaH option

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timing check option

- **fstaH -help : Show help message**
- **Syntex:**
  - General Syntax : fstaH -group <sdc_id> <mode 1> <mode 2> <mode ...> [-ip/-nonip] [-ptsi] [-glitch] [-gen_aocv_index] [-chk_aocv_index]
  - CPF-In Flow Syntax: fstaH -msv <cpf_file_name> <mode 1> <mode ...> [-ip/-nonip] [-ptsi] [-glitch] [-gen_aocv_index] [-chk_aocv_index]
- **Option:**
  - [-ip/-nonip] : Specify design will be used for other design (-ip) or not (-nonip)
  - [-ptsi] : Enable Primetime-SI analysis and generate glitch report ("Notice [-ptsi] should using with [-ip/-nonip]")
  - [-glitch] : Only glitch report ("Notice [-glitch] can mix with [-ptsi]")
  - [-gen_aocv_index] : fstaH only generates aocv table index and aocv table for each scenario in folder \${DESIGN}_AOCV
  - [-chk_aocv_index] : fstaH only verify aocv table index and aocv table for each scenario in folder \${DESIGN}_AOCV

AOCV flow

- **AOCV mode needs to generate aocv table index at first**
  - %> fstaH –group $SDC aocvwg –gen_aocv_index
  - %> fstaH –msv $project aocv –gen_aocv_index

```
================================================================
** Information(fstaMsg-2): Generating AOCV Table Index: "RDN1_rdn_domain_wrapper.aocv_index"
================================================================
Finish fsta_ux.tcl main_flow : Fri Jul 01 03:41:06 PM CST 2016
```

  - %> fstaH –group $SDC aocvwg –ptsi [–nonip|-ip]
  - %> fstaH –msv $project aocv –ptsi [–nonip|-ip]

```
================================================================
** Information(fstaMsg-1): Summary for FSJ0FS060A_AOCVWG_RCMAX125C_PTSI_setup_rpts
** Information(fstaMsg-1): Report Design.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report Annotated.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report Constraint.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report SetupChk.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report SetupChk_reg2reg.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report SetupChk_in2reg.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report SetupChk_reg2out.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report CkGatingSetup.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report Coverage.rpt has 0 warnings and  0 violations.
** Information(fstaMsg-1): Report CheckTiming.rpt has 5 warnings and  0 violations.
** Information(fstaMsg-1): Report sta2xml.rpt has 0 warnings and  0 violations.
Finish fsta_ux.tcl main_flow : Fri Jul 01 04:23:56 PM CST 2016

Program ends normally.
```

ac_scan false path generation

- **Please follow STA sign-off criteria**
- **For process >= 40nm :**
  - (non-CPF-in)
    - fstaH -gen_ac_scan_constraint <proj>_TDF <mode1> <mode2> ... [-ptsi] [-ip/-nonip]
    - <mode> : n / b / w / wcc / ocvw / ocvwcc
  - (CPF-in)
    - fstaH -gen_ac_scan_cpf_constraint <cpf_file_name> <mode 1> <mode 2> ...[-ptsi] [-ip/-nonip]
    - <mode> : Only "BW" and "OCV" are allowed.
- **For process = 28nm, the recommended generation corners are below :**
  - (non-CPF-in)
    - fstaH -gen_ac_scan_constraint <proj>_TDF aocvwg aocvwcgc aocvbg aocvbcgh -ptsi [-ip/-nonip]
  - (CPF-in)
    - fstaH -gen_ac_scan_cpf_constraint <cpf_file_name> AOCV -ptsi [-ip/-nonip]

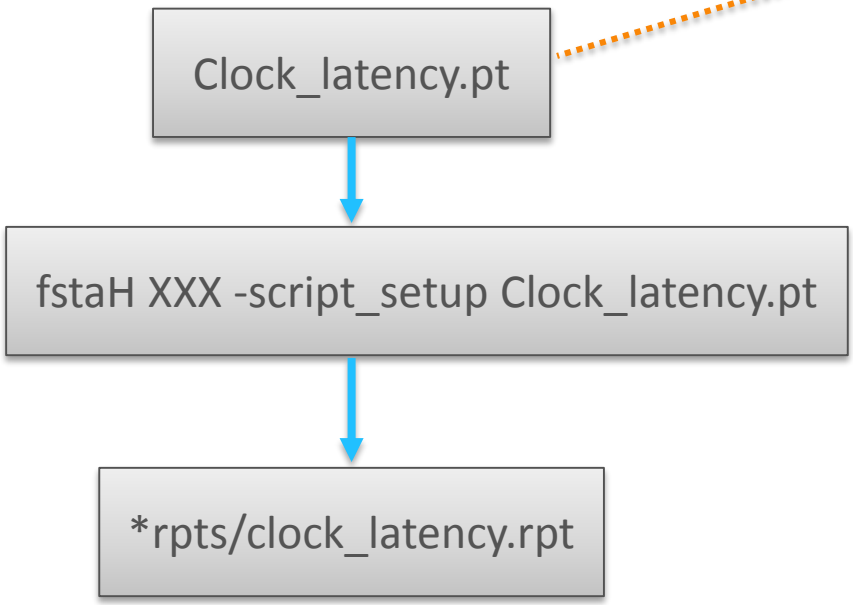
fdrc database generation

- **Generate SetTrans and SetLoad**
  - [-trans] : Input Transition (digital number)
  - [-load] : Output Loading (digital number)
  - [-drive_cell_sdc] : User Specify Boundary Constraint, only allow one corner. (SDC file)
  - (non-CPF-in)
    - fstaH -gen_trans_load <mode 1> <mode ...> [-trans 0.15] [-load 0.03] [-drive_cell_sdc]
    - <mode> : Only "B", "N", "W", "WCC", "BCH", "WG", "WCGC", "WCG0", "BG", "BCGH" are allowed.
  - (CPF-in)
    - fstaH -msv <cpf_file> <mode> -gen_trans_load [-trans 0.15] [-load 0.03] [-drive_cell_sdc]
    - <mode> : Only "BW" is allowed.
- **Generate CKC & Case analysis file for sdc-driven fdrc**
  - (non-CPF-in)
    - fstaH -group <sdc_id_1> <mode> -group <sdc_id_2> <mode> .... -gen_files_for_fdrc
    - <mode> : Only "B", "N", "W", "WCC", "BCH", "WG", "WCGC" are allowed.
  - (CPF-in)
    - fstaH -msv <cpf_file> <mode> -gen_files_for_fdrc
    - <mode> : Only "BW" is allowed.

User Specified Script

- **fstaH XXX -script_setup <script> -script_hold <script>**

Clock_latency.pt :
report_clock_timing -type summary -nosplit > clock_latency.rpt



Collect timing result into xml file

- **STA2XML Syntax: fstaH -sta2xml**
- **Example:**
  - ${working_directory}/Constraint.xml

View Group	Time	sdc/cpf view	RCorner	PVT	OCV	PTSI	total(lost)	in2reg		reg2reg		reg2out		recovery/remova		clock_gating	
								WNS	#vio	WNS	#vio	WNS	#vio	WNS	#vio	WNS	#vio
	Setup	FSJ0FS172A_shift	CMAX	ssg0p81v1	AOCV	PTSI	17(-0)	0	0	0	0	0	0	-0.07	17	0	0
			CMIN	ffg0p99v12	AOCV	PTSI	64(-0)	0	0	-0.048	53	0	0	-0.013	11	0	0
			RCMAX	ffg0p99v12	AOCV	PTSI	80(-0)	0	0	-0.037	65	0	0	-0.018	15	0	0
shift	Hold	FSJ0FS172A_shift	CMAX	ssg0p81v1	AOCV	PTSI	89(-0)	0	0	-0.141	89	0	0	0	0	0	0

fstaH scenario

fstaH scenario

fstaH Scenario	Process
MSV	
CPF	All Process
UPF	All Process
PreLayout	
ZWLM	All Process
AWLM	All Process
PostLayout	
SPEF-in Flow	All Process

fstaH -check

- **Check general setting in setup.ftc.fsta**
  - %> fstaH –check

fstaH is in SPEF-in with RC-corner and w/o ETM db Flow now, this flow is used for 65nm process and below w/o ETM db

Please check the following variable in setup.ftc.fsta
STA_PERFORMANCE_EVALUATE_ENABLE = OFF
SDF_PER_CORNER_OR_CPF_FLOW = ON

- **Check input files setting**
  - %> fstaH –gen_fsta_control

fstaH scenario

- **ZWLM Flow**
- **AWLM Flow**
- **MSV Flow**
  - cpf
  - upf
- **SPEF-in w/o RC-Corner Flow**
- **SPEF-in with RC-Corner Flow**
  - w/o ETM
  - with ETM

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fstaH scenario

- **ZWLM Flow**
- **AWLM Flow**
- **MSV Flow**
  - cpf
  - upf
- **SPEF-in w/o RC-Corner Flow**
- **SPEF-in with RC-Corner Flow**
  - w/o ETM
  - with ETM

ZWLM Flow

- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = ON
  - STA_PERIOD_DISCOUNT = 0.60
- **Output file**
  - Report Directories:
    - ${DirName}_ZWLM_rpts

fstaH scenario

- ZWLM Flow
- **AWLM Flow**
- MSV Flow
  - cpf
  - upf
- SPEF-in w/o RC-Corner Flow
- SPEF-in with RC-Corner Flow
  - w/o ETM
  - with ETM

AWLM Flow

- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = AUTO
  - STA_PERIOD_DISCOUNT = 0.85(40nm↑) | 0.79(28nm)
- **Output file**
  - Report Directories:
    - ${DirName}_AUTO_rpts

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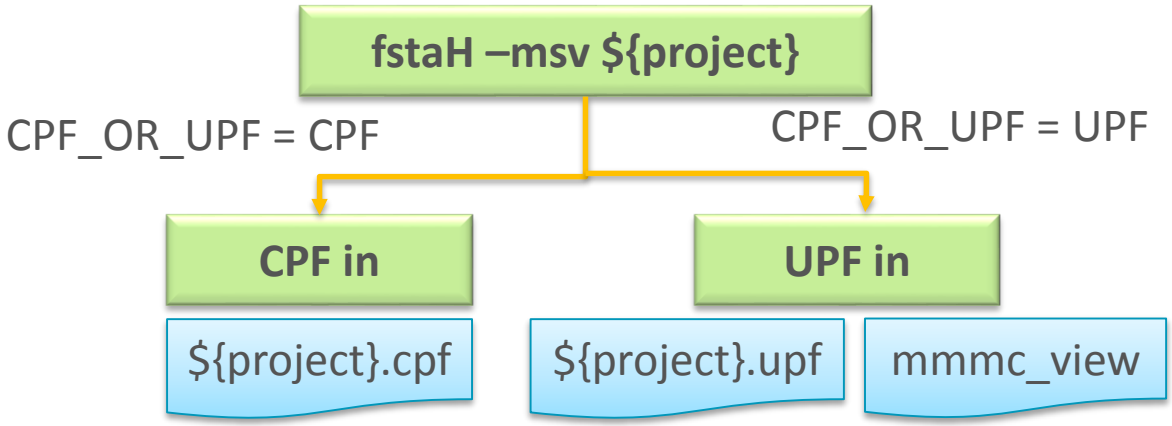
fstaH scenario

- ZWLM Flow
- AWLM Flow
- **MSV Flow**
  - cpf
  - upf
- SPEF-in w/o RC-Corner Flow
- SPEF-in with RC-Corner Flow
  - w/o ETM
  - with ETM

MSV flow



- **Usage**
  - fstaH –msv ${project} ${op_mode}
    - ${op_mode} can be BW, OCV or AOCV
      - "**BW**", "**OCV**", and "AOCV" used to distinguish into "**NO Derating**", "**Derating by OCV**", "Derating by AOCV and OCV"

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MSV flow - cpf

- **Input file**
  - .db
  - .v
  - .sdc
  - ${project}.cpf
  - ${project}_${rccorner}.spef
- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = OFF
  - SDF_PER_CORNER_OR_CPF_FLOW = ON
  - CPF_OR_UPF = CPF
  - CPF_DEFAULT_ANALYSIS_VIEW = view1
  - CPF_SETUP_ANALYSIS_VIEW = view1
  - CPF_HOLD_ANALYSIS_VIEW = view2 view3
  - CPF_VIEW_TO_RC_CORNER = “view1 $rccorner1 $rccorner2” “view2 $rccorner3 $rccorner4” “view3 $rccorner3 $rccorner4”

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MSV flow - upf

- **Input file**
  - .db
  - .v
  - .sdc
  - ${project}.upf
  - mmmc_view
  - ${project}_${rccorner}.spef
- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = OFF
  - SDF_PER_CORNER_OR_CPF_FLOW = ON
  - CPF_OR_UPF = UPF
  - CPF_DEFAULT_ANALYSIS_VIEW = view1
  - CPF_SETUP_ANALYSIS_VIEW = view1
  - CPF_HOLD_ANALYSIS_VIEW = view2 view3
  - CPF_VIEW_TO_RC_CORNER = “view1 $rccorner1 $rccorner2” “view2 $rccorner3 $rccorner4” “view3 $rccorner3 $rccorner4”

fstaH scenario

- ZWLM Flow
- AWLM Flow
- MSV Flow
  - cpf
  - upf
- **SPEF-in**
  - w/o RC-Corner Flow (90nm~350nm)
  - w/ RC-Corner Flow (28nm~65nm)

SPEF-in w/o RC-Corner Flow (90nm~350nm)

- **Input file**
  - .db
  - .v
  - .sdc
  - ${project}.spef (110nm~350nm) | ${project}_typical.spef (90nm)
- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = OFF
  - SDF_PER_CORNER_OR_CPF_FLOW = ON
  - STA_PVT_W = SS0P81V125C
  - STA_PVT_B = FF0P99VM40C
- **Usage**
  - fstaH –group ${sdcname} w b ocvb
  - fstaH –group ${sdcname} w –ptsi

SPEF-in w/ RC-Corner Flow (28nm~65nm)

- **Input file**
  - .db
  - .v
  - .sdc
  - ${project}_${rccorner}.spef
- **setup.ftc.fsta**
  - STA_PERFORMANCE_EVALUATE_ENABLE = OFF
  - SDF_PER_CORNER_OR_CPF_FLOW = ON
  - STA_PVT_W = SS0P81V125C
  - STA_RCCORNER_WC = CMAX125C RCMAX125C
- **Usage**
  - fstaH –group ${sdcname} ocvw w

setup.ftc.fsta

PVT and rccorner

- If I want to run wcc_cmax and wcc_rcmax …

```
%fstaH –group $sdcname wcc
STA_PVT_WCC = SS0P81VM40C
STA_RCCORNER_WCC = CMAXM40C RCMAXM40C
STA_TIMING_LIB_SS0P81VM40C_CMAX = …
STA_TIMING_LIB_SS0P81VM40C_RCMAX = …
```

- If I want to run ocvwcc_cmax and ocvwcc_rcmax w/o ETM model

```
%fstaH –group $sdcname ocvwcc
STA_PVT_WCC = SS0P81VM40C
STA_RCCORNER_WCC = CMAXM40C RCMAXM40C
STA_TIMING_LIB_SS0P81VM40C_CMAX = …
STA_TIMING_LIB_SS0P81VM40C_RCMAX = …
```

- If I want to run ocvwcc_cmax and ocvwcc_rcmax w/ ETM model

```
%fstaH –group $sdcname ocvwcc
STA_PVT_WCC = SS0P81VM40C
STA_RCCORNER_WCC = CMAXM40C RCMAXM40C
STA_TIMING_LIB_SETUP_SS0P81VM40C_CMAX = …
STA_TIMING_LIB_SETUP_SS0P81VM40C_RCMAX = …
```

fstaH will auto transfer SS0P81VM40C to SSG0P81VM40C when running wcgc
User don't need to specify STA_PVT_WCGC = SSG0P81VM40C

Library Setting

If I want to run wcc_cmax/ wcgc_cmax corner……

- When STA_AUTO_GET_LINK_LIBRARY = OFF

- PVT and rccorner definition:
STA_PVT_WCC = SS0P81VM40C
STA_RCCORNER_WCC = CMAXM40C

- library with normal corner :
STA_TIMING_LIB_**SS**0P81VM40C_CMAX = $ss_core $ss_IP

- library with normal corner :
STA_TIMING_LIB_**SS**0P81VM40C_CMAX = $ss_core $ss_IP

- library & non_derate-ETM with normal corner :
STA_TIMING_LIB_**SS**0P81VM40C_CMAX = $ss_core $ss_IP $ss_ETM_cmax

- library & setup-ETM with global corner :
STA_TIMING_LIB_**SETUP_SSG**0P81VM40C_CMAX = $**ssg**_core $ssg_IP $setup_ssg_ETM_cmax

- library & hold-ETM with global corner :
STA_TIMING_LIB_**HOLD_SSG**0P81VM40C_CMAX = $**ssg**_core $**ssg**_IP $**hold_ssg**_ETM_cmax

Timing report parameter

- **The following parameters setting will append to report_timing –path_type … -sig …**
  - STA_MAX_PATH
  - STA_MAX_PBA_PATH
  - STA_PBA_METHOD
  - STA_RPT_PATHTYPE
  - STA_NWORST
  - STA_SLACK_LESS_THAN
  - STA_SLACK_GREATER_THAN
  - STA_SIGNIFICANT_DIGITS
  - STA_DELAY_CALC_DEBUG : add “-transition_time -capacitance -net” when report_timing.
- **STA_SPLITRPT_INTO3PART :** Enable/Disable the function to split the setup/hold timing report into three different files according to the path type.
  - [Setup|Hold]Chk_in2reg.rpt
  - [Setup|Hold]Chk_reg2reg.rpt
  - [Setup|Hold]Chk_reg2out.rpt
- **STA_CRPR_THRESHOLD :** Specify the amount of pessimism that crpr is allowd to leave in the timing report.
  - Default: 1 (minimum value)

User specified parameter - Uncertainty/OCV

- **STA_USERSPECIFIED_MARGIN**
  - If this option is set to “OFF”, fstaH will automatically apply the hold time uncertainty for each process sign-off criteria. If users want to specify hold time uncertainty, users can set this option to “ON”.
  - Example:
    - STA_USERSPECIFIED_MARGIN = ON
    - [SDC] set_clock_uncertainty -hold 0.055 [all_clocks]
- **STA_USERSPECIFIED_DERATING_FILE**
  - If this option is set to “OFF”, fstaH will automatically apply derate value for each process sign-off criteria. If users want to specify derate value, users can set this option to “derating.pt”
  - Example:
    - STA_USERSPECIFIED_DERATING_FILE = derating.pt

User specified parameter – Propagated clock

- **Propagated clock but w/o spef**
  - [setup.ftc.fsta]
    - STA_PERFORMANCE_EVALUATE_ENABLE = AUTO
    - STA_USERSPECIFIED_CLOCK_PROPAGATED = ON
  - [sdc]
    - set_propagated_clock [all_clocks]
- **Not propagated clock but w/ spef**
  - [setup.ftc.fsta]
    - STA_PERFORMANCE_EVALUATE_ENABLE = OFF
    - STA_USERSPECIFIED_CLOCK_PROPAGATED = ON
  - [sdc]
    - remove_propagated_clock [all_clocks]

Boundary constraint

- **DEFAULT_INPUT_SLEW**
  - Specify the input slew for the input port which does not set in sdc.
- **DEFAULTPAD**
  - Specify the output load for output port which does not set in sdc.

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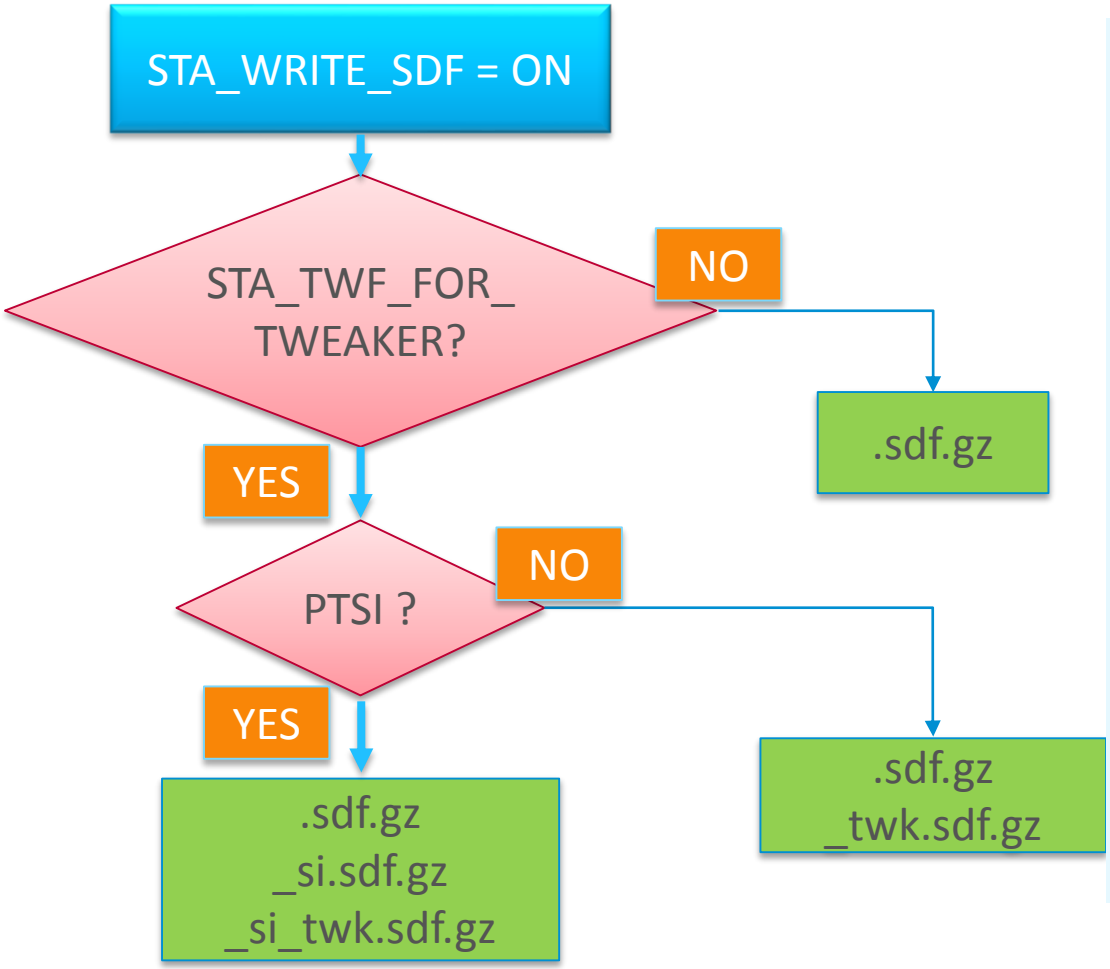
DMSA related

- **STA_DMSA**
  - Enable/Disable to run the distributed STA.
- **STA_MULTICORE_NUM**
  - Specify the maximum number of CPU cores that can be used for each subsequently launched remote process.
- **STA_MULTIPROC_NUM**
  - Specify the number of processes to launch per host for future PrimeTime jobs.
- **STA_LICENSE_NUMBER**
  - Specify the number of scenarios to run simultaneously.
- **HOSTS**
  - Specify the available machine to run the distributed STA.
    - You have the permission to login these remote machines.
    - You have add the name of these remote machines into ~/.rhosts.

SDF related



1. .sdf.gz
   - Generate for simulation
   - Not include the timing arc for internal pin
   - Effected by "STA_SDF_WITHOUT_INSTANCE"
2. _si.sdf.gz
   - (1.) + ptsi
3. _twk.sdf.gz
   - Generate for tweaker
   - include the timing arc for internal pin
   - Not effected by "STA_SDF_WITHOUT_INSTANCE"
4. _si_twk.sdf.gz
   - (3.) + ptsi

Auto apply ETM and pure analog to STA_SDF_WITHOUT_INSTANCE

- **When using etm.db and pure analog to generate top.sdf, sdf may include ETM timing arc at sdf, this will cause simulation warning**
  - sdf

```
(CELL
  (CELLTYPE "FZOTG300HH0L")
  (INSTANCE u_core/u_SBS_USB3_TOP/FZOTG300HH0L_inst_0)
(DELAY
  (ABSOLUTE
  (IOPATH APB_CLK APB_READY (0.6182::0.6446) (0.5975::0.6194))
```

  - VCS simulation : *Warning-[SDFCOM_TANE] TIMINGCHECK Annotation Not Enabled*
- **At setup.ftc.fsta , add instance at STA_SDF_WITHOUT_INSTANCE , fstaH will not generate this instance timing arc at .sdf.gz and _si.sdf.gz**
  - STA_SDF_WITHOUT_INSTANCE = (empty) or doesn't exists this variable, fstaH auto apply ETM and pure analog to filter
    - timing_model_type == extracted
    - Pure analog : FXPORK* , FXADC* , FXLVDS* , FXAFE*
    - Check the result at *rpts/fsta_script/WriteSDF.pt

```
write_sdf -context verilog -significant_digits 4 -input_port_nets  -output_port_nets -v
ersion 3.0 -exclude checkpins  -include "setuphold recrem" -no_edge -no_internal_pins
-exclude_cells "u_core/u_FXADC882HH0L_FTCM8A_1 u_core/u_FXADC882HH0L_FTCM8A u_core/u_DW
CAXI_PCIE_0XSERDES201HH0L/0XSERDES201HH0L_inst_0 u_core/u_ax_e_core/u_por_bf u_core/u_S
BS_USB3_TOP/FZOTG300HH0L_inst_0 u_core/u_SYSC/u_FTSCU100/u_PWRCTRL_UNIT/u_PCUPOR/u_CORE
POR" -compress gzip  FSH0AS038A_FSH0AS038A_post_tc_VIEW_TCCOM_PM_ALL_ON_typical_si.sdf.
gz
```

  - STA_SDF_WITHOUT_INSTANCE = OFF
    - write_sdf w/o "-exclude_cells"
  - STA_SDF_WITHOUT_INSTANCE = u_core/u_SBS_USB3_TOP/FZOTG300HH0L_inst_0 u_core/u_DWCAXI_PCIE_0XSERDES201HH0L/0XSERDES201HH0L_inst_0
    - fstaH will not auto apply ETM and pure analog, but apply user defined instances

Tweaker related

- **STA_TWF_FOR_TWEAKER**
  - When this option is “ON”, fstaH will generate file for tweaker.
- **STA_SDF_OF_EACHSDC**
  - When this option is “ON”, fstaH will generate the sdf file according to different sdc settings. This means that each sdc will generate a unique corresponding *sdf* file. When this value is off, fstaH will remove the case_analysis settings to generate a general sdf.

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