

# Thoughts on file structures and work flow – 2/8/2006

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**DBB**

# SWIM sample execution model

*Typical component*

## Simulation Control File(s)

Select specific component codes (e.g. TORIC vs AORSA)

Code-specific initialization data

Fusion machine specific data

Simulation control data:

Computer environment settings

Plasma initial conditions

Plasma source and control, time sequences (events)

## Simulation Controller

Computer environment initialization

Plasma state initialization

Component initialization

Advance Sequence:  $[t \rightarrow t+\Delta t]$

Step RF

Step Particle Source

Step Fokker Planck Solver

Solve  $j_{||}(E)$

Step Profiles

Step Magnetics & Equilibrium

Test linear stability

Apply Reduced MHD if unstable

Evaluate Simulation Control  
terminate, take another step, or  
adjust and restart current step

## RF Component

RF\_step:

Get\_plasma\_state

Convert plasma state to code-specific form and write code-specific initialization data

Launch Implementing code: (i.e. AORSA, TORIC, or GENRAY)

Convert code specific output to plasma\_state form

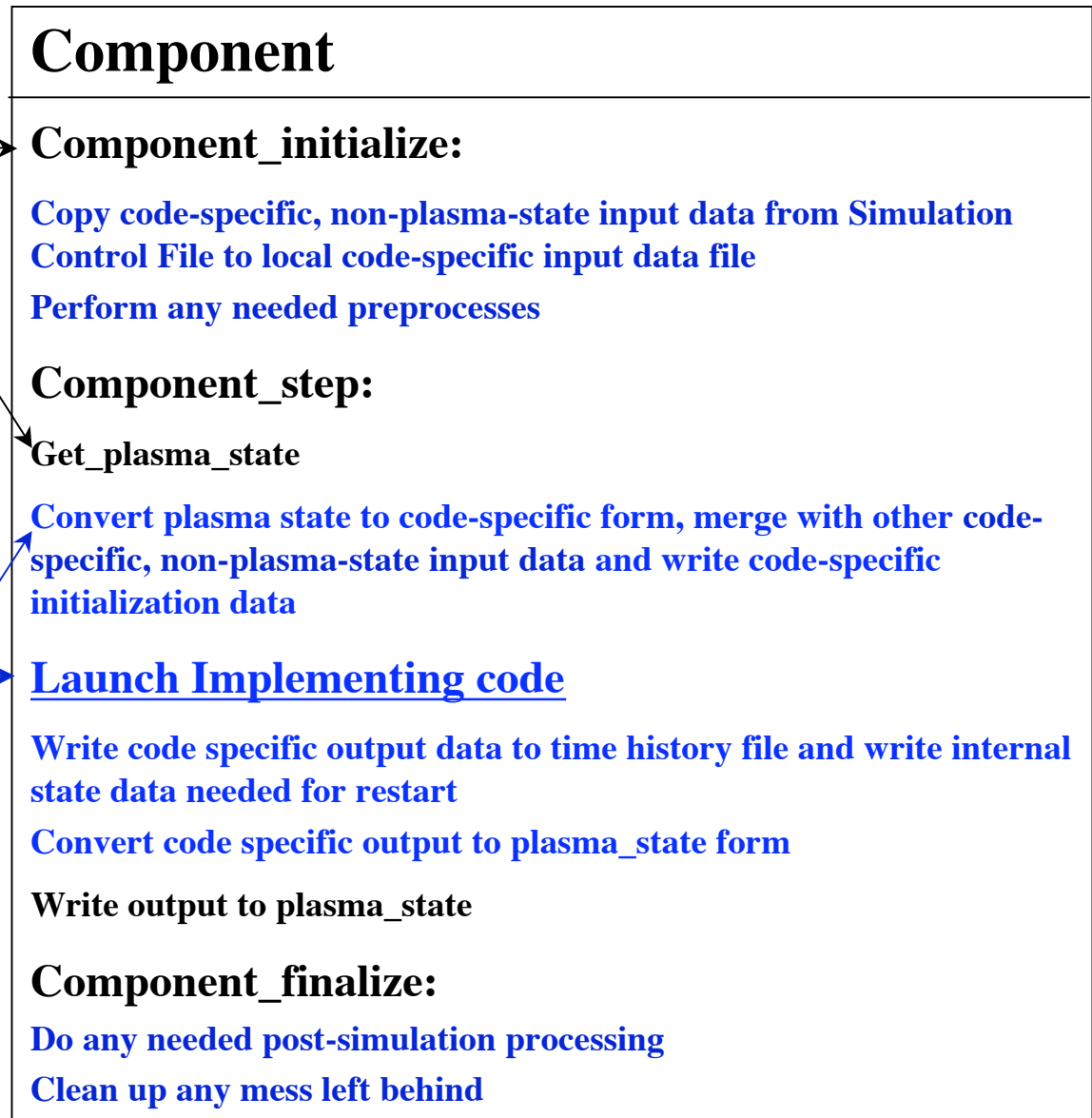
Save internal state of component

Write output to plasma\_state

# Typical component interfaces and work flow

Things in black are generic, provided at component level

Things in blue are code specific. Require action by code developer



# Draft: Simulation record file directory: IPS\_run\_XYX/

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## Time invariant inputs

- **simulation\_control\_file\_XYZ( $t_0$ )** – initial simulation conditions, paths to other files
- **machine\_definition\_data\_file** – standard file for DIII-D, ITER, JET ...
- **initial\_plasma\_state\_data( $t_0$ )** – numbers and paths to EQBM and profile files
- (simulation event files and source waveform files) – time dependent simulation controls
  
- **component\_A\_input\_XYZ( $t_0$ )** – code specific input for component (e.g. AORSA/TORIC)
- **component\_B\_input\_XYZ ( $t_0$ )**
- ...
- **plasma\_state\_data( $t_n$ )** – state data for present time step
- **plasma\_state\_history ( $t_0, t_n$ )** – validated record of simulated plasma state
- **component\_A\_restart ( $t_0, t_n$ )** – record of component internal state needed to restart
- **component\_B\_restart ( $t_0, t_n$ )**
- ...
- **component\_A\_history\_XYZ ( $t_0, t_n$ )** – other data generated by component to be recorded
- **component\_B\_history\_XYZ ( $t_0, t_n$ )**
- ...

## Time variant outputs

## Draft: Component working directory: component\_A/

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- **Standard component\_A\_input\_files ( $t_n$ )**
- **(component code working files)**
- **Standard component\_A\_output\_files ( $t_n$ )**

# Component Initialization

**Simulation record  
directory:  
IPS\_run\_XYZ/**

**simulation\_control\_file\_XYZ( $t_0$ )**  
**machine\_definition\_data\_file**  
**initial\_plasma\_state\_data( $t_0$ )**  
**(simulation event files and  
source waveform files)**

**component\_A\_input( $t_0$ )**  
**component\_B\_input( $t_0$ )**  
...  
**plasma\_state\_data( $t_n$ )**  
**plasma\_state\_history ( $t_0, t_n$ )**  
**component\_A\_restart ( $t_0, t_n$ )**  
**component\_B\_restart ( $t_0, t_n$ )**  
...  
**component\_A\_history( $t_0, t_n$ )**  
**component\_B\_history( $t_0, t_n$ )**  
...

## Simulation Controller

Computer environment  
initialization

Plasma state initialization

**Component initialization**

Advance Sequence:  
[ $t \rightarrow t+\Delta t$ ]

**step\_component\_A**

...

Evaluate Simulation Control

terminate, take another step, or  
adjust and restart current step

*Typical component*

**Working directory:  
component\_A/**

**Standard component\_A\_input( $t_0$ )**

**(component code working files)**

**Standard component\_A\_output( $t_0$ )**

# Component Step

