A Brief Roadmap to Running C2VSim-FG

This document provides a brief description of the organization of the C2VSim-FG model files, and a roadmap to running and obtaining results from the model.

C2VSim-FG is built using the Integrated Water Flow Model (IWFM) framework. The model includes input files in text format, and output files of which some are in text format and others in a binary format. The files in text format can be opened and viewed with any text editor software (e.g. Notepad, Textpad, etc.). The output files in binary format must be processed by tools supplied along with the C2VSim-FG model to view and analyze the model results.

Folder Structure

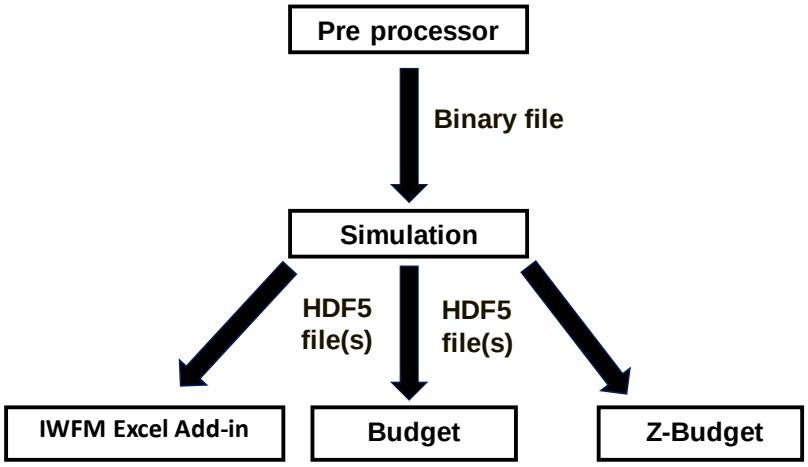
The input and output files for C2VSim-FG are organized in a way that follows how the model is run and the results processed as described in the next section. The different folders for the input and output files are as follows:

1) **Bin:** Includes executable files that are used to run the model and process its results.
2) **Preprocessor:** Includes input files in text format that describe the C2VSim-FG model framework: the numerical grid, aquifer layering and the location of the streams.
3) **Simulation:** Includes input files in text format that list information on physical characteristics of the Central Valley aquifers, streams and soils as well as historical land-use distribution, agricultural and urban development and water use, stream diversions and climate. Within this folder, additional folders exist (Groundwater, RootZone and Streams) to group the input files according to the hydrologic component they describe.
4) **Results**: Includes model results that includes simulated hydrographs and water budgets. Some of these files are in text format. Files with a filename extension "*hdf*" are in binary format and must be processed with dedicated tools to view their contents.
5) **Budget**: Includes an input file to help process the Budget output files in binary format stored in the *Results* folder and convert them into text files.
6) **Z-Budget:** Includes an input file to help process the Zone Budget output files in binary format stored in the *Results* folder and convert them into text files.
7) **Excel:** Includes Excel files corresponding to different water budgets. These Excel files include the same information that is included in the binary Budget files in the *Results* folder.

Running C2VSim-FG

C2VSim-FG uses three steps to run and obtain the model results (Figure 1):

Figure 1 *Running C2VSim-FG*



1) **Run Preprocessor:** In this step, information regarding the grid, aquifer layering and stream network used in C2VSim-FG is read in and processed. The processed information is printed to a file to be used in the second step, running Simulation. This first step is performed only once and is not necessary to be performed every time the model is run.

   To run Preprocessor, double-click Run_Preprocessor.bat file located in the *Preprocessor* folder.

2) **Run Simulation:** This is the main step where the model is run to simulate the flow processes and water demands in the Central Valley for the simulation period. During this step, C2VSim-FG prints results (groundwater and stream flow hydrographs at selected locations, subregional water budgets for different hydrologic components, zone budget outputs to be post-processed for user-defined zones) to files in the *Results* folder as the simulation progresses in time. To allow monitoring of the simulation progress, C2VSim-FG also prints messages to a text file named SimulationMessages.out.

   The text files (binary files are listed in bullet items 3 and 4 below) Simulation creates in the *Results* folder are

   - *C2VSimFG_Hydrographs_GW.out*: Groundwater head hydrographs at selected locations (listed in file *Simulation\Groundwater\C2VSimFG_Groundwater1974.dat*)
   - *C2VSimFG_Hydrographs_SW.out*: Streamflow hydrographs at selected stream nodes (listed in file *Simulation\Streams\C2VSimFG_Streams.dat*)

- *C2VSimFG_HeadAll.out*: Groundwater heads at all model nodes at each aquifer layer

To run Simulation, double click Run_Simulation.bat file located in the *Simulation* folder.

3) **Run Budget:** Simulation generates several binary files in the *Results* folder which store water budget information for different hydrologic components. These files are
   - *C2VSimFG_GW_Budget.hdf*: Groundwater budget at 21 water accounting subregions
   - *C2VSimFG_Streams_Budget.hdf*: Stream flow budget at each stream reach
   - *C2VSimFG_L&WU_Budget.hdf*: Land and water use budget at 21 water accounting subregions
   - *C2VSimFG_RZ_Budget.hdf*: Root zone budget at 21 water accounting subregions
   - *C2VSimFG_Unsat_Budget.hdf*: Unsaturated zone water budget at 21 water accounting subregions
   - *C2VSimFG_SWatersheds_Budget.hdf*: Water budget at simulated small watersheds
   - *C2VSimFG_Diversions.hdf*: Information for each diversion regarding requested and simulated diversion amounts along with any diversion shortages

   Running Budget post-processor reads information from these binary files and prints them into their respective text files where the water budget results can be viewed using any text editor software.

   To run Budget, double-click Run_Budget.bat file located in the *Budget* folder.
4) **Run Z-Budget**: Simulation generates several binary files in the *Results* folder which store water budget information at each grid cell for different hydrologic components:
   - *C2VSimFG_GW_ZBudget.hdf*: Groundwater budget at each model cell
   - *C2VSimFG_L&WU_ZBudget.hdf*: Land and water use budget at each model cell
   - *C2VSimFG_RZ_ZBudget.hdf*: Root zone budget at each model cell
   - *C2VSimFG_Unsat_ZBudget.hdf*: Unsaturated zone budget at each model cell

   Using the Z-Budget post-processor, cells can be grouped into zones and accumulated water budgets for these zones can be generated. These water budgets are printed to text files with "*bud"* filename extensions.

   To run Z-Budget, double-click Run_ZBudget.bat file double in the Z-Budget folder.

Post-processing C2VSim-FG Results

Water budgets at subregions or grid cells can be post-processed buy running Budget or Z-Budget post-processors as explained above. Another way to post-process these results are by using the IWFM Tools Excel Add-in that can be downloaded from the IWFM web site at https://www.water.ca.gov/Library/Modeling-and-Analysis/Modeling-Platforms/Integrated-Water-Flow-Model (see *Support Tools* section on this webpage). This tool can be used to quickly import water budget information into Excel for further visualization and analysis of C2VSim-FG model results.