

OPMRUN Graphical User Interface For OPM Flow

David Baxendale (Author) Joakim Hove (Presenter)

> **OPM-OP AS** Heyerdahlsvei 12b 777 Oslo, Norway F: +(47)-9268-5704

E: support@opm-op.com

T: +(47)-9268-5704

ОРМ-ОР A Graphical User Interface For OPM Flow

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2020-02-04	Rev-1	Final 2020-04	D. Baxendale	N/A	N/A
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ОРМ-ОР OPMRUN: What Is It?

- A graphical user interface to OPM Flow that has similar functionality to the commercial simulator's ECLRUN program.
- Target audience are Reservoir Engineers in a production environment. Developers and experienced Linux users will already have compatible work flows.
- Allows editing and management of OPM Flow's run time parameters. Default parameters are automatically loaded from OPM Flow, and the user can reset the default set either from a parameter or *.PRT file. Editing of a job's parameter file is also available.
- Allows simulation jobs to be queued and run in either foreground (under OPMRUN), or background (in an xterm terminal session). All jobs in the queue can be set to run in NOSIM mode or RUN mode.
- Foreground jobs can be killed from OPMRUN.
- Queues can be edited, saved and loaded.
- Jobs can be compressed to save space (*.DATA and all OPM Flow output files) and uncompressed.
- OPM Flow Keyword Generator New Application (this presentation).
- Written in Python 3 and tested under Unbuntu-Mate 18.04 TLS.
- Compiled binary version should work on all Linux systems, no need to install dependencies or Python.

OPM-OP A Graphical User Interface For OPM Flow

OPMRUN KEYWORD GENERATOR (OPMKEYW)

- Objective:
 - Generate OPM Flow keywords in a consistent manner and make the generation of a "deck" of keywords relatively straight forward.
 - Able to be used with any editor via cut and paste.
 - Able to create and edit existing keyword templates.
 - Target audience are Reservoir Engineers and Developers.
- Application:
 - Based on the Apache Velocity Template Language ("VTL"). The templates can therefore also be used with any editor that supports VTL, jEdit for example.
 - One template per keyword, with formatting the same as the OPM Flow manual. Over 450 templates are currently implemented.
 - One can also customize the existing templates as well as creating User defined templates by including the templates in the template directory and following the VTL language syntax.
 - Keywords filtered by Section in alphabetic order, and can also list all the keywords.
 - Multiple keywords can be generated at a time and copied to the clipboard or saved to a file.
 - Section keywords (RUNSPEC, GRID, EDIT, PROPS, SOLUTION, SUMMARY and SCHEDULE) can
 optionally generate a set of keywords for the section.
 - The keywords are examples, one still has to edit the resulting deck with the actual required data, but the format with comments should make this a straight forward process.

- OPMRUN options have been expanded to include the "template directory" and the "author property" fields.
- The "author property" fields are used in some templates to document the file.
- Note if a "author property" field is not defined then the template variable will be output instead – this can easily be deleted in the application.

Set Parameters	🐔 Edit Options		- ×	
Projects	OPM Flow Manual Location			
	"/home/david/OPM/OPM Flow [Documentation 2019-10 Rev-1 Reduced.pdf"	Browse	
	OPM Keyword Generator Temp	late Directory		
	/media/sf_D_DRIVE/User/Baxe	ndaleD/Development/GitHub/opm-utilities/opmrun/opmvtl	Browse	
	ResInsight Command			
Add Job Edit Job Dele	"/usr/bin/ResInsight"		Browse	
Dutput Log	Editor Command for Editing Inp	ut Files		
OPMRUN Started	"jedit"			
	OPM Keyword Generator Varial	les		
	Author	OPMUSER		
	Company Name	OPM-OP AS		
	Address Line 1	Heyerdahlsvei 12b		
	Address Line 2	777 Oslo, Norway		
	Email Address	noreply@opm-op.com		
	Main Window Configuration Sat	ting		
	Input Element Width	144		
	Input Element Height	10		
	Output Element Width	140		
	Output Element Height	30		
	Output Element Font	Courier		
	Output Element Font Size	10		

- The Keyword Generator is located under the "Tools" menu "Deck Generator" option.
- Additional Deck Generator applications are planned for future versions.

it Tools Help	
Compress Jobs	
Deck Generator r Keyword Generator	
Kesinsigin	
Job Edit Job Delete Job Clear Queue Load Queue Save Queue	
ut Log	
MRUN Started	
Jobs Kill Job Clear Exit	



Keyword Filter Options

	CPMRUN Keywo	ord Generation Utility					- ×
Keyword List	Keyword Filter	⊖ HEADER	ି RUNSPEC ି GRID	C EDIT C PROPS		C SCHEDULE	ି ALL
	COMMENT A DEBUG ECHO END ENDINC ENDSKIP EXTRAPMS INCLUDE MESSAGES NOECHO NOWARN SKIP SKIP100 SKIP300 WARN		OPMRUN - Flow Job Sc OPM Flow Input Keyword Gen the Open Porous Media ("OPM This module generates input di the Apache Velocity Template language used by many progra directly with an editor provided parse the templates and the ke	heduler 2020-04.01 eration Utility is a Graphical I ") Flow simulator ecks based of the keywords a Language ("VTL") for the terr mming editors, and therefore the editor supports VTL. The y templates are comparable		×	
Deck Element		>	OPM Flow Manual. The "Keyword Filter" button all section, including being able to keyword will result in the keyw editable by simply clicking any The "Clear" button will will clear the text in the Deck element to eriter. The text can also be as	ows for the filtering of the var list all the keywords availabl ord being "pasted" into the D where in the element and ma ar the Deck element of all tex the clipboard from which you	ious keywords in the selected le for all sections. Clicking on a eck element. This element is king changes. t, and the "Copy" button will copy u can paste the text in your chosen a the "Save" button		
			See the OPM Flow manual for	further information.			
			OK				M
	Clear Copy	Help Save Exit					

- OPMRUN Keyword Generation Utility
- The Keyword Filter button allows for the filtering of the various keywords in the selected section, including being able to list all the keywords available for all sections.
- The HEADER section allows for a start and end of file comment headers.
- Clicking on a keyword will result in the keyword being "pasted" into the Deck Element.

HEADER-EOF	************************************
HEADER-LICENSE HEADER-LONG	 OPM FLOW SIMULATION FILE
HEADER-OPM HEADER-SHORT	 COPYRIGHT NOTICE
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	Copyright (C) 2020 Equinor ASA Copyright (C) 2020 Equinox International Petroleum Consultants Pte. Ltd
	COMMENTS
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OPMRUN Keyword Generation Utility The Deck Flement Keyword Filter HEADER
 GLOBAL O RUNSPEC O GRID O EDIT O PROPS O SOLUTION O SUMMARY O SCHEDULE O ALL is editable by HEADER-EOF HEADER-INCLUDE simply clicking HEADER-LICENSE HEADER-LONG OPM FLOW SIMULATION FILE anywhere in the HEADER-OPM HEADER-SHORT element and -- COPYRIGHT NOTICE making changes. -- This file is part of the Open Porous Media project (OPM). OPM is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version. Use the "Clear" button to clear the -- This file is made available under the Open Database License: http://opendatacommons.org/licenses/odbl/1.0/. **Deck Element** Any rights in individual contents of the database are licensed under the Database Contents License: display. Note that http://opendatacommons.org/licenses/dbcl/1.0/ OPM is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of this will cause all MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the aforementioned GNU General Public Licenses for more details. changes to be -- Copyright (C) 2020 Equinor ASA -- Copyright (C) 2020 Equinox International Petroleum Consultants Pte. Ltd deleted. -- COMMENTS Base Case run for testing MULTX keywords. 1 3 5 6 8 9 0 1 3 0 0 Ø 0 1 0 0 Clear Copy Help Save Exit

- If a keyword requires a file, for example, the INCLUDE and LOAD keywords, then a dialog box is presented to enable the file to be selected.
- Will also allow one to select the file name format, after the file has been selected.
- The COMMENT keyword, is not an actual keyword, but a comment block to make the deck more readable.

Keyword Filte	r CHEADER I GLOBAL CRUNSPEC CGRID CEDIT CPROPS CSOLUTION CSUMMARY CSCHEDULE CALL
JUMMENT DEBUG CCHO END ENDINC ENDSKIP EXTRAPMS INCLUDE MESSAGES NOECHO NOWARN SKIP SKIP100 SKIP300 NARN	Example Comment Section - Load Grid Data via Include Files Example Comment Section - Load Grid Data via Include - Load Grid
	Select INCLUDE File Format IRAP_1005 GRDECL/IRAP_1005.GRDECL //media/sf_D_DRIVE/Linux/OPM/Nome/Model/INCLUDE/GRID/IRAP_1005.GRDECL Submit Cancel

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- Selecting a Section keyword (RUNSPEC, GRID, EDIT, PROPS, SOLUTION, SUMMARY, and SCHEDULE) will give an option to generate a representative set of keywords for that section.
- One can therefore generate a complete input deck in a matter of minutes.
- However, you still ٩ have to edit this with your actual data.

EPOIN 🛆 ASC		
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SPEC	Do You Wish to Generate the Standard Keywords for the	
NITO	SKIP ACTIVATE RUNSPEC Section?	
C	OPTIONS OPTION	
SPEC	OPTIONS Yes No	
M	//-9 1	
JK C	INPUT AND OUTPUT OPTIONS	
E5		
UL I		
ONG	METRIC SYSTEM OF UNITS FOR BOTH INPUT AND OUTPUT	
19	METRIC	
DTMS		
MFR	SWITCH ON THE INTETED INDIT ETLES ODITON	
AL		
IMS	UNIFIN	
COMP		
RUNSP		
PEC	SWITCH ON THE UNIFIED OUTPUT FILES OPTION	
PTS		
E I	UNIFOUT	
/DIMS		
ENT		
T	MESS COMMIN WARN PRODE ERROR DUG MESS COMMIN WARN PRODE ERROR DUG	
ACT	MESSAGES	
ACTW	3000 1* 1000 1000 1* 1* 1* 1* 9000 1* 9000 1* /	
DIMS		
MAL	DEBUG PRINTING OPTIONS	
E		
ERS	DEBUG	
IMS	810 1 1110 1 3010 /	
IMS		
IMS		

- For The SCHEDULE Section keyword, one can also generate a date schedule from a start year to and end year, using Annual, Quarterly, or Monthly time steps.
- A standard report is written at the beginning of each year and is subsequently switch off for intermediate Quarterly and Monthly time steps.

A final report is written at the end of the run.

GRUPTARG GRUPTREE GUIDERAT LGRFREE LGRLOCK LGROFF LGRON NETBALAN NETBALAN NETBALAN NETBALAN NETBALAN NETBALAN NETBALAN NETBALAN NETBALAN PINULTAB PINULTAB PRORDER QORILL PRORDER QORILL DAT RPTRST RPTSCHED SCHEDULE SKIPREST TUNING TUNINGD DAT	1 JLY 2019 / 1 OCT 2019 / SCHEDULE SECTION - 2020-01-01 SCHED 'WELLS=2' 'WELSPECS' 'WELLS=2' 'WELSPECS' 'WELLS=2' 'WELSPECS' 'WELLS=2' 'WELSPECS' 'SCHED 'WELSPECS' 'NOTHING' Generate SCHEDULE Section Date Keywords Parameters SCHED Start Year 'NOTHING' End Year 'SCHED C Annual Report and Time Steps
UUQ VFPCHABL VCONHIST WCONINJE WCONINJH WCONINJP WCONINJP WCONROD WCONROD WCONROD WDFAC WDFAC WDFACCOR WDRILPRI WDRLITIM WECON WECONT WECONT WECONT WECONT WECAC WELONT WELDRAW	1 APR 2020 / Annual Report and Quarterly Time Steps Annual Report and Monthly Time Steps OCT 2020 / Submit Cancel FINAL REPORT AND RESTART AT YEAR END SCHED 'WELLS=2' 'WELSPECS' 'CPU=2' 'FIP=2' 'A 'BASIC=2' 'BASIC=2' 'A

- Use the "Copy" button to copy the data in the Deck Element to the clipboard, which can then be pasted into your favorite editor.
- Alternatively, one can save the data directly to a *.DATA or *.INC file for further editing and processing.

Keyword Filter	○ HEADER ○ GLOBAL ○ RUNSPEC ○ GRID ○ EDIT ○ PROPS ○ SOLUTION ○ SUMMARY ④ SCHEDULE ○ ALL
GRUPTARG A GRUPTREE GUIDERAT LGRFREE LGRLOCK LGROFF LGRON NETBALAN NETBALAN NETSTEP	1 JLY 2019 / 1 OCT 2019 / / SCHEDULE SECTION - 2020-01-01
PIMULTAB PRIORDITY PRORDER QDRILL RPTRST RPTSCHED SCHEDULE SKIPREST TSTEP	RPTSCHED 'WELSPECS' 'CPU=2' 'FIP=2' / DATES 1 JAN 2020 / / / Save Keywords to File Save Keywords to File
TUNING TUNINGDP UDQ VFPCHK VFPTABL WCONINJE WCONINJE WCONINJH WCONINJP WCONINJP WCONINJP	DATES I APR 2020 / I JLY 2020 / I OCT 2020 / FINAL REPORT AND RESTART AT YEAR END I/media/sf_D_DRIVE/User/BaxendaleD/Development/(Save As Ok Cancel Ok Cancel Ok Cancel Concel Concen Concen Concen Concen Concen Concen
WOFAC WOFAC WDFACCOR WDRILPRI WORILTIM WECON WECONINJ WECONT WECONT WECONT WELCNTL WELCNTL WELCATL	RPTSCHED 'WELLS=2' 'WELSPECS' 'CPU=2' 'FIP=2' / RPTRST 'BASIC=2' / DATES 31 DEC 2020 / /
Clear Copy	Help Save Exit

OPMRUN Keyword Generation Utility ø.

- After selecting a 3 keyword, right clicking on the keyword allows one to load the actual template for the keyword.
- One can then edit the template and save the changes back to the same template or another template.
- Probably a good idea to save as a separate template.
- The Template Help 0 option displays a brief introduction to VTL.

Keyword Filter	○ HEADER ● GLOBAL ○ RUNSPEC ○ GRID ○ EDIT ○ PROPS ○ SOLUTION ○ SUMMARY ○ SCHEDULE ○ ALL
Keyword Filter	C HEADER • GLOBAL C RUNSPEC C GRID C EDIT C PROPS SOLUTION SUMMARY SCHEDULE ALL
M	This is not a comment. ## This is a comment ## This whole line is a comment Multi-line comments are indicated by a start (# *) and end comment indicator (*#). For example: OK
Clear Copy	Help Save Exit

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- Status:
 - Currently under going final testing. Once complete will be uploaded to GitHub together with documentation.
 - The Keyword Generator can also be used standalone, but the preferred application is within OPMRUN to leverage Project directories etc.
 - The standard alone version is operating system independent, just need Python and the various modules.
 - Considering generating standalone binaries, downloadable from the company's web site, if there is a need.
 - Considering generating additional Deck Generator applications:
 - Deck Sensitivity Generator: Using an existing input deck, generate sensitivity runs via parameter substitution based on Full Factorial or an Experimental Design. Generate queue and optionally run all the jobs.
 - Deck Production Generator: Load CSV file with production data and generate an OPM Flow SCHEDULE section using the WCONHIST keyword.
 - Deck DST Generator: Load a CSV containing DST pressure gauge data and a CSV file containing DST rate data and generate an OPM Flow SCHEDULE section using the WCONHIST keyword, with automatic merging of the two data sets and user defined sampling (5, 10 minutes etc).
 - Feedback welcome on current application and future developments.

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End of Presentation