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Results	Query	Domains (original links)
Unique	id Mohammad Arif Rasyidi Department of Informatics Universitas Internasional Semen Indonesia Gresik, Indonesia mohammad	-
Unique	To analyze the process flow in more detail in several dimensions needs cube process	-
Unique	Keywords—process mining, OLAP, heuristic miner, production planning	-
Unique	There are many popular applications that have logs to learn and analyze	-
Unique	One of them is the application of Enterprise Resource Planning (ERP)	-
Unique	There are several modules in SAP application, one of which is the production planning	-
Unique	Business process modeling in an application can be done by using process mining technique	-
Unique	Cube is a method previously known and widely used in data warehouse	-
Unique	In the data warehouse, multidimensional cube is a representation of a star schema [3]	-
Unique	This technique is called Online Analytical Processing (OLAP)	-
Unique	The analysis was done by slicing a set of log module production planning	-
Unique	This is an open access article under the CC BY-NC license (http://creativecommons.org/licenses/by-nc/4.0/)	-
Unique	In this case, the data from ERP application is	-
Unique	The data will then be filtered first and converted into event log with	-
Unique	mxml format using Disco application	-
Unique	The structure dimension shows the model's ability to handle XOR and AND processes	-
Unique	Generally, the grouping of goods is divided into three, male, female and kids	-
Unique	This indicates that the products processed through SAP applications are mostly intended for female	-

Unique	Each type (male, female, and kids) is depicted in two types of diagrams, ie	-
Unique	fuzzy net processed from Disco and Heuristic net applications	-
Unique	The conformance calculation for the three models can be seen in Table III	-
Unique	The data shows the statistics and conformance value of each event log	-
Unique	Female Heuristic Net 151 Atlantis Highlights in Engineering (AHE), volume 2 Fig	-
Unique	The measurement of modeling result was done by using conformance checking	-
Unique	The measurement of the structure obtained the result of 1 for all types	-
Unique	REFERENCES [1] Gartner, "FrontRunners for Enterprise Resource Planning, April 2017," April 2017	-
Unique	softwareadvice.com/erp/#top-products	-
Unique	XYZ dengan Kriteria Control-Flow.," Jurnal SISFO, vol	-
Unique	Aalst, "Conformance checking of processes based on monitoring real behavior," Journal Information Systems, vol	-
Unique	153 Atlantis Highlights in Engineering (AHE), volume	-
Unique	OLAP Cube Processing of Production Planning Real-life Event Log: A Case Study Rachmadita Andreswari Information	-
Unique	id Abstract— Business process modeling in an application log can be done by using process	-
Unique	The multidimensional depiction in star schema to perform Online Analytical Processing (OLAP) can be	-
Unique	This research was conducted to analyze log characteristic in the production planning module by	-
Unique	The analysis was done by performing process cube on a set of log module	-
Unique	In this study the dimensions used in process cube are event class, timestamp and	-
Unique	Data that had been processed with the cube was modeled by using Heuristic miner	-
Unique	by female of 1 while the best precision in male is at 0.56, and the	-
Unique	The result of measurement also shows that the number of transitions and places in	-
Unique	Overall, the existence of the cube process performed has influenced the process model and	-
Unique	INTRODUCTION Identifying the process recorded on an application can be done by modeling logs	-
Unique	This application is a type of application that is widely used in large companies	-
Unique	Based on the research results conducted by Gartner in 2017 [1], it is obtained	-
	This module is an important module in SAP application that serves to handle	

Unique	<u>the</u>	-
Unique	<u>Therefore, in this research, a business process modeling on production planning module of SAP</u>	-
Unique	<u>To analyze the process flow in more detail in several dimensions, a cube process</u>	-
Unique	<u>The cube process is a way of modeling a process using several different dimensions</u>	-
Unique	<u>The multidimensional depiction of the star schema allows users to perform data analysis by</u>	-
Unique	<u>There are several analyzes that can be done, for example, drill-down, roll-up, slice, and</u>	-
Unique	<u>Referring to the previous research [2], this study was conducted to analyze the log</u>	-
Unique	<u>Data that has been processed with cube will be modeled by using algorithm that</u>	-
Unique	<u>Based on the research [5] it is stated that the most appropriate and robust</u>	-
Unique	<u>In addition, it is mentioned in [6] that the Heuristic miner algorithm has</u>	-
Unique	<u>The expected result is to know the different characteristics of each log sliced so</u>	-
Unique	<u>METHODOLOGY In performing event log analysis from the production planning process, stages were performed</u>	-
Unique	<u>2.1 Downloading ERP application logs This stage is the beginning part of model making</u>	-
Unique	<u>To download application logs, the important thing to note is the compatibility of activity</u>	-
Unique	<u>2.2 Processing logs with OLAP cube To perform the log processing by using OLAP,</u>	-
Unique	<u>analysis based on certain criteria [4] 2.3 Performing data conversion 148 Copyright © 2019, the</u>	-
Unique	<u>International Conference on Industrial Enterprise and System Engineering (IcoIESE 2018) Atlantis Highlights in Engineering</u>	-
Unique	<u>This application is not only capable of converting but also capable of analyzing and</u>	-
Unique	<u>2.4 Modeling the event log with the Heuristic miner algorithm A pre-processed log event</u>	-
Unique	<u>To create a process model is done by entering the event log on the</u>	-
Unique	<u>Furthermore, an algorithm can be selected according to the event log type, and in</u>	-
Unique	<u>For event logs that have been processed into process models of Heuristic net, the</u>	-
Unique	<u>The process model and the result of the measurement are the representations of the</u>	-
	<u>Processes Based on Monitoring Real Behavior” there are four dimensions of</u>	

Unique	process model evaluation currently	-
Unique	The fitness dimension calculates how many occurrences of the records that are recorded in	-
Unique	The precision dimension (Advanced Behavioral Appropriateness) describes how many events that may be formed	-
Unique	Dimension generalization is a dimension in the contrast to the precision dimension, and it	-
Unique	it was found that the cube process is a way of modeling the process with	-
Unique	Each part of the cube is an event that is used as input in	-
Unique	As described earlier, the OLAP cube includes slice, dice, roll-up, and drill-down operations although	-
Unique	DATA COLLECTION Modeling process was done by creating event log from the ERP application	-
Unique	Before the event log was made, it was necessary to identify the dimensions for	-
Unique	In this study the dimensions used are event class, activity, and timestamp, as shown	-
Unique	Production Planning Cube Design Furthermore, the following is a piece resulting from the creation	-
Unique	31539966 Create Plan Order 1/18/13 6:00 As an illustration, here is the statistical data of	-
Unique	First, the data is sliced to separate based on the type of goods produced	-
Unique	The table shows that most data is the data for female type with average	-
Unique	Line 35 7 19 9 7 Convert On 449 77 243 129 8 Start Production	-
Unique	RESULT AND DISCUSSION The result of business process modeling of production planning based on	-
Unique	of production planning in Figure 2, there are more repetitions on the activity of "Run	-
Unique	The incident shows that in the phase of plan order a change in production	-
Unique	Unlike male, the fuzzy net for female and kids also happens to loop more	-
Unique	Different results were obtained on Heuristic net modeling in which the log event for	-
Unique	Female type had 7 transitions and 10 places while kids had 7 transitions and	-
Unique	complicated than the male and female types, so the results of the conformance calculation will	-
Unique	for the male type and for the value of the structure had the same value	-
Unique	more complicated (there were more transitions of hidden task and there were places), the conformance	-
Unique	1 Adv Behavioral App 0.56 0.495 0.495 0.495 Structure 1 1 1 1 152 Atlantis	-
Unique	CONCLUSION In this research, the business process modeling was done by	-

[using the cube](#)

Unique	Event logs that had been processed with OLAP cube were then processed with Heuristic	-
Unique	The result of the measurement is that when it is closer to 1, will	-
Unique	The calculation of conformance checking performed shows that the best fitness value obtained by	-
Unique	was obtained by male type of 0.56, then female and kids values are each of	-
Unique	The process modeling of kid type also obtained information that there were more places	-
Unique	this indicated the number of transitions and places in a process model influences the measurement	-
Unique	This study also confirmed that Heuristic miner algorithm is an algorithm which is capable	-
Unique	its measurement, but the measurement results were not in line with the number of event	-
Unique	Aalst. "Process Cubes: Slicing, Dicing, Rolling Up and Drilling Down Event Data for Process	-
Unique	Kim. "A data warehouse-based decision support system for sewer infrastructure management." Automation in Construction	-
Unique	Cernesson. "Multidimensional modeling and analysis of large and complex watercourse data: an OLAP-based solution."	-
Unique	Weerdt. "Process Mining for the multi-faceted analysis of business processes— A case study in	-
Unique	Andreswari. "Analisis Kinerja Algoritma Penggalan Proses untuk Pemodelan Proses Bisnis Perencanaan Produksi dan Pengadaan	-

OLAP Cube Processing of Production Planning Real-life Event Log: A Case Study Rachmadita Andreswari Information System Department, Faculty of Industrial and System Engineering, Telkom University Bandung, Indonesia andreswari@telkomuniversity.ac.id Mohammad Arif Rasyidi Department of Informatics Universitas Internasional Semen Indonesia Gresik, Indonesia mohammad.rasyidi@uisi.ac.id Abstract— Business process modeling in an application log can be done by using process mining technique. To analyze the process flow in more detail in several dimensions needs cube process. The multidimensional depiction in star schema to perform Online Analytical Processing (OLAP) can be done by drill-down, roll-up, slice, and dice method. This research was conducted to analyze log characteristic in the production planning module by performing the cube process. The analysis was done by performing process cube on a set of log module of production planning. In this study the dimensions used in process cube are event class, timestamp and activity. Data that had been processed with the cube was modeled by using Heuristic miner algorithm. The results obtained from this study are those for the three parts of data that have been processed with the cube, the best measurement value for fitness was obtained by female of 1 while the best precision in male is at 0.56, and the value of each structure is at 1 for each data. The result of measurement also shows that the number of transitions and places in a process model influences the measurement of conformance value. Overall, the existence of the cube process performed has influenced the process model and the resulting measurement. Keywords—process mining, OLAP, heuristic miner, production planning I.

INTRODUCTION Identifying the process recorded on an application can be done by modeling logs that have been stored therein. There are many popular applications that have logs to learn and analyze. One of them is the application of Enterprise Resource Planning (ERP). This application is a type of application that is widely used in large companies in the world. Based on the research results conducted by Gartner in 2017 [1], it is obtained the

31539966 Change Plan Order Date 1/9/13 11:00 31539966 Run MRP 1/10/13 16:30 31539966 Create Plan Order 1/11/13 6:00 31539966 Change Plan Order Date 1/16/13 11:00 31539966 Run MRP 1/17/13 16:30 31539966 Create Plan Order 1/18/13 6:00 As an illustration, here is the statistical data of activity for each class. (Table II). First, the data is sliced to separate based on the type of goods produced in accordance with the target consumers. Generally, the grouping of goods is divided into three, male, female and kids. The table shows that most data is the data for female type with average of 50% for each activity. This indicates that the products processed through SAP applications are mostly intended for female. TABLE II. PRODUCTION PLANNING EVENT LOG

Sum All	Male	Female	Kids
1	Start	582	115
317	150	149	Atlantis Highlights in Engineering (AHE), volume 22
Run MRP 1756	377	912	467
3	Create Plan Order	1756	377
4	Issued Production Order	449	77
243	129	5	Change Plan Order Date
641	186	297	158
6	Change Plan Line	35	7
19	9	7	Convert On
449	77	243	129
8	Start Production	449	77
243	129	IV. RESULT AND DISCUSSION	The result of business process modeling of production planning based on cube operation which has been done can be seen in figure 2 - 7 below. Each type (male, female, and kids) is depicted in two types of diagrams, ie. fuzzy net processed from Disco and Heuristic net applications. Fig. 2. Male Fuzzy Net Fig. 3. Male Heuristic Net

150 Atlantis Highlights in Engineering (AHE), volume 2 Based on the flow of production planning in Figure 2, there are more repetitions on the activity of "Run MRP □ Create Plan Order □ Change Plan Order Date". The incident shows that in the phase of plan order a change in production planning still often occurs. Unlike male, the fuzzy net for female and kids also happens to loop more on the same flow. Different results were obtained on Heuristic net modeling in which the log event for male type had 5 transitions of hidden task and 9 places. Female type had 7 transitions and 10 places while kids had 7 transitions and 11 places. These results show that the model produced for the type of kids is more complicated than the male and female types, so the results of the conformance calculation will show in accordance with the flow conditions that have been modeled with the Heuristic miner. The conformance calculation for the three models can be seen in Table III. The data shows the statistics and conformance value of each event log. The results obtained from the fitness, precision, and structure values for the three types were that the highest fitness was in the female log event while the highest precision for the male type and for the value of the structure had the same value of 1 for all three types. On the other hand, in the type of kids in which the modeling was more complicated (there were more transitions of hidden task and there were places), the conformance calculation obtained was also lower than the other two types, both for fitness and precision. Fig. 4. Female Fuzzy Net Fig. 5. Female Heuristic Net

Male	Female	Kids	All Event
1293	3186	1638	6117
Case 115	317	150	582
Activity 8	8	8	8
Start Date 11	Desember 2012	15	October 2012
6	Desember 2012	15	October 2012
Male	Female	Kids	All
End Date 21	January 2013	26	January 2013
22	January 2013	26	January 2013
Fitness 0.996	1	0.956	1
Adv Behavioral App 0.56	0.495	0.495	0.495
Structure 1	1	1	1
152	Atlantis Highlights in Engineering (AHE), volume 2	V. CONCLUSION	In this research, the business process modeling was done by using the cube process for a case in the production planning module. Event logs that had been processed with OLAP cube were then processed with Heuristic miner algorithm. The measurement of modeling result was done by using conformance checking. The result of the measurement is that when it is closer to 1, will more represent the existing event log. The calculation of conformance checking performed shows that the best fitness value obtained by female was at 1, then male at 0.996 and kids at 0.956. On the other hand, for the precision measurement (advanced behavioral appropriateness) the best value was obtained by male type of 0.56, then female and kids values are each of 0.495. The measurement of the structure obtained the result of 1 for all types. The process modeling of kid type also obtained information that there were more places and transitions (in the form of hidden task). Based on the results of measurements, kids had lower value than others so that this indicated the number of transitions and places in a process model influences the measurement of conformance values. This study also confirmed that Heuristic miner algorithm is an algorithm which is capable of modeling the process in a short time with good quality. Overall, the existence of process cube performed has influenced the produced process model and its measurement, but the measurement results were not in line with the number of event logs of each data. REFERENCES [1] Gartner, "FrontRunners for Enterprise Resource Planning, April 2017," April 2017. [Online]. Available: http://www.softwareadvice.com/erp/#top-products . [2] W. M. v. d. Aalst, "Process Cubes: Slicing, Dicing, Rolling Up and Drilling Down Event Data for Process Mining," Asia Pacific Business Process Management, pp. 1-22, 2013. [3] T. Park and H. Kim, "A data warehouse-based decision support system for sewer infrastructure management," Automation in Construction, pp. 37-49, 2013. [4] K. Boulil, F. Le Ber, S. Bimonte, C. Grac and F. Cernesson, "Multidimensional modeling and analysis of large and complex watercourse data: an OLAP-based solution," Ecological Informatics, pp. 90-106, 2014. [5] J. D. S. A. V. A. & B. B. Weerd, "Process Mining for the multi-faceted analysis of business processes—A case study in a financial services organization.," Computers in

Industry, pp. 57-67, 2013. [6] R. Andreswari, "Analisis Kinerja Algoritma Penggalan Proses untuk Pemodelan Proses Bisnis Perencanaan Produksi dan Pengadaan Material pada PT.XYZ dengan Kriteria Control-Flow.," Jurnal SISFO, vol. 5, no. 1, pp. 1- 8., 2014. [7] A. Rozinat and W. M. P. v. d. Aalst, "Conformance checking of processes based on monitoring real behavior," Journal Information Systems, vol. 33, no. 1, pp. 64-95, 2008. 153 Atlantis Highlights in Engineering (AHE), volume 2