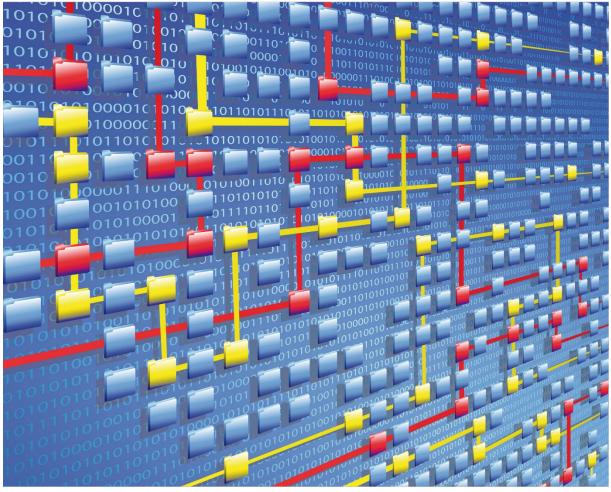
# **IEEE Task Force on**



# **Process Mining**

# XES CERTIFICATION FOR RAPIDPROM: LIBRARY

# TABLE OF CONTENTS

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# TOOL

# Tool

NAME RapidProM Library

### VENDOR

Developed by - Eindhoven University of Technology, Open Source

Maintained by – RWTH Aachen University, Open Source

### VERSION

4.0.1

### REQUESTED CERTIFICATION LEVELS



# META

# Meta

### AUTHORS

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Madhavi.shankar@pads.rwth-aachen.de

### DATE

12/11/2020

### HISTORY

CHANGES		
AUTHOR(S)	DATE	DESCRIPTION
Madhavi Shankar	12/11/2020	Initial recordings for the certification

### **IMPORT**

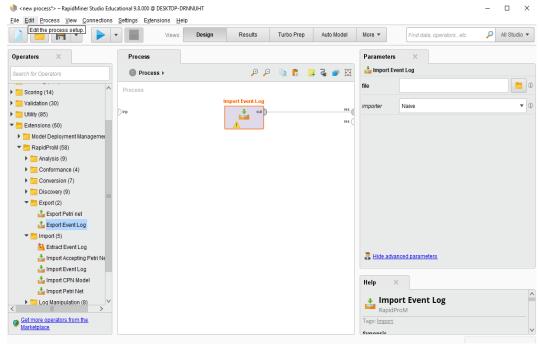
### Import

### INSTALLATION AND GETTING STARTED

- 1. Firstly install the latest version of RapidMiner ( current version is 9.8) from https://my.rapidminer.com/nexus/account/index.html#downloads.
- 2. Go to "Extensions" in Menu and select "MarketPlace (Updates and Extensions)."
- 3. In the Search bar, type "RapidProM" and look for the latest version of RapidProM (Currently 4.0.1) and select for installation.
- 4. Once installation is complete restart RapidMiner tool
  - 4.1. Go to Operators -> Extensions -> RapidProM.
    - 4.1.1. We can different packages here for import, export of logs.
    - 4.1.2. We can also find packages to perform discovery, analysis, conformance and conversions.

To start working with RapidPRoM:

- 1. Launch RapidMiner
- 2. From Menu Click on File->New Process
- 3. Choose Blank Process from the popup menu
- 4. Go to Operators -> Extensions -> RapidProM -> Import
- 5. Drag and drop "Import Event Log" to the process page
- 6. Connect to the res



7. Choose a log on the right in Parameters sections

ile <u>E</u> dit <u>P</u> ro (	Open File       Please sele	ct a file to open.				×	All Studio
)perators							
Search for Ope	Real-life			_ ← 5	🕴 🛧 🏦 🖆 🛛	<b>a</b> ▼	
DesidDes14/6	Bookmarks	File Name	Size	Туре	Last Modifi		ampl 📒
RapidProM (5	🛨 Last Directory	BPIC12.xes	70 MB	XES File	Aug 13, 2020	^	
🔁 Analysis (9		BPIC13_closed_problems.xes	3 MB	XES File	Aug 13, 2020		-
🔁 Conformar		BPIC13_incidents.xes	37 MB	XES File	Aug 13, 2020		· ·
Conversio		BPIC13_open_problems.xes	1 MB	XES File	Aug 13, 2020		
Discovery		BPIC15_1.xes	39 MB	XES File	Aug 13, 2020		
Export (2)		BPIC15_2.xes	32 MB	XES File	Aug 13, 2020	=	
		BPIC15_3.xes	44 MB	XES File	Aug 13, 2020		
Import (5)		BPIC15_4.xes	35 MB	XES File	Aug 13, 2020		
🐴 Extract I		BPIC15_5.xes	43 MB	XES File	Aug 13, 2020		
📥 Import /		BPIC17 - Offer log.xes	105 MB	XES File	Aug 13, 2020		
🃥 Import i		BPIC17.xes	552 MB	XES File	Aug 13, 2020		
📥 Import (		MPN1709.xes	947 KB	XES File	Sep 17, 2020		
		MPN17091.xes	3 MB	XES File	Sep 17, 2020	$\sim$	
Log Manip	BPIC12.xes						
	file (*.xes)					•	
Get more o from the Ma					Open 🗙 Can	cel	

- 8. Click on play button or press F11
- 9. To change the event log Click on "Design" in views and you will be redirected to step 6

Note: The screenshots displayed under each import log will only be the final one after step 8, which shows the log summary.

### **REAL-LIFE LOGS**

### SANITIZED BPIC LOGS

NAME	TRACES	EVENTS	SIZE IN KB
BPIC12	13,087	262,200	72,363
BPIC13_closed_problems	1,487	6,660	4,090
BPIC13_incidents	7,554	65,533	38,627
BPIC13_open_problems	819	2,351	1,370
BPIC15_1	1,199	52,217	40,261
BPIC15_2	832	44,354	33,616
BPIC15_3	1,409	59,681	45,673
BPIC15_4	1,053	47,293	36,131
BPIC15_5	1,156	59,083	44,961
BPIC17 – Offer log	42,995	193,849	107,557
BPIC17	31,509	1,202,267	565,373

#### BPIC12



#### BPIC13\_closed\_problems



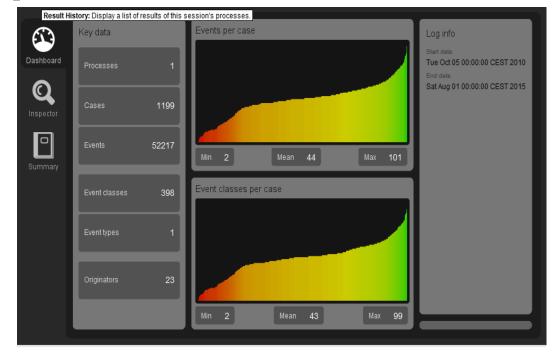
### **BPIC13\_incidents**



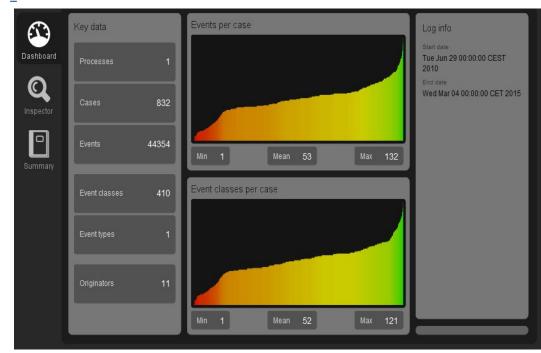
#### BPIC13\_open\_problems



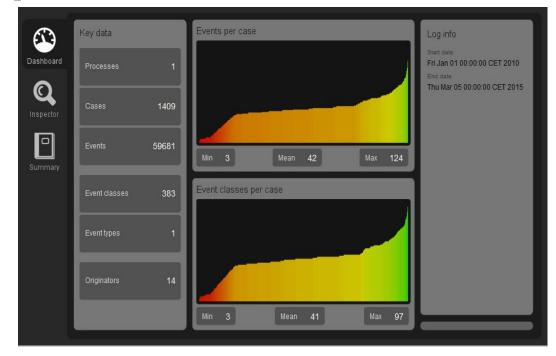
#### BPIC15\_1



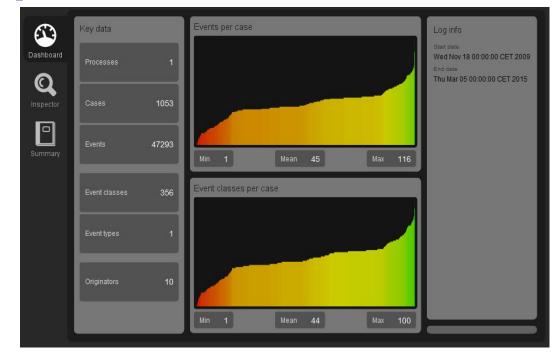
BPIC15\_2



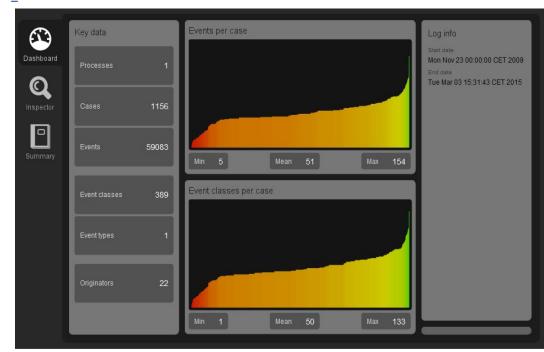


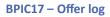






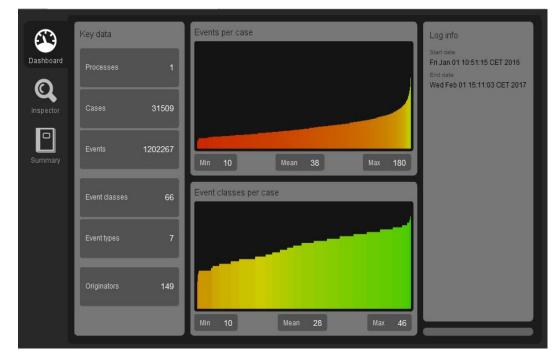
#### BPIC15\_5







BPIC17



### **ARTIFICIAL LOGS**

### FILTERED REPAIREXAMPLE LOGS

NAME	LEVEL	EVENT ATTRIBUTE KEYS (IF BOLD THEN GLOBAL)
LevelA1	A1	concept:name
LevelA2	A2	Classifier (concept:name AND lifecycle:transition)
LevelB1	B1	concept:name, lifecycle:transition, time:timestamp
LevelB2	B2	Classifier (concept:name AND lifecycle:transition), time:timestamp
LevelC1	C1	concept:name, org:resource
LevelC2	C2	Classifier (concept:name AND lifecycle:transition), org:resource
LevelD1	D1	concept:name, concept:instance, lifecycle:transition,

		org:resource, org:group, org:role, time:timestamp
LevelD2	D2	Classifier (concept:name AND lifecycle:transition), concept:instance, org:resource, org:group, org:role, time:timestamp
FlagX1	X1	defectFixed, defectType, <b>Key 1</b> , Key 2, <b>Key 3</b> , <b>Key 4</b> , <b>Key 6</b> , phoneType, numberRepairs, <b>{0,1,2} 2Sa!! +1 <x></x></b> , ITEMS:41, #1, o.1.1
FlagX2	X2	defectFixed, defectType, Classifier ( <b>Key 1</b> AND <b>Key 6</b> ), Key 2, <b>Key 3</b> , <b>Key 4</b> , phoneType, numberRepairs, <b>{0,1,2} 2Sa!! +1 <x></x></b> , ITEMS:41, #1, o.1.1

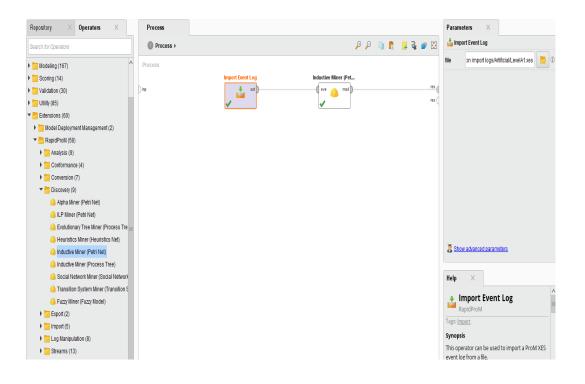
ATTRIBUTE TYPES AND VALUES	5	
KEYS	TYPE	VALUES
concept:instance Key 2	string	instance 1 instance 2 instance 3 instance 4
concept:name (A1 and C1 logs)	string	Analyze Defect+complete Analyze Defect+start Archive Repair+complete Inform User+complete Register+complete Repair (Complex)+complete Repair (Complex)+start

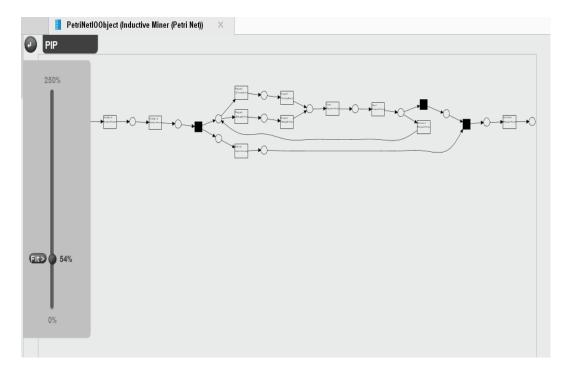
concept:name (other logs) Key 1	string	Repair (Simple)+complete Repair (Simple)+start Restart Repair+complete Test Repair+complete Test Repair+start Analyze Defect Archive Repair Inform User Register Repair (Simple) Repair (Complex) Restart Repair Test Repair
lifecycle:transition Key 6	string	start complete
org:group {0,1,2} 2Sa!! +1 <x></x>	string	Group - Group 1, 3, and 5 Group 2 and 4
org:resource Key 3	string	SolverC1 SolverC2 SolverC3 SolverS1 SolverS2 SolverS3 System Tester1 Tester2 Tester3 Tester4 Tester5 Tester6
org:role ITEMS:41, #1, o.1.1	string	Role 1, 2, and 3 Role 10 Role 9
time:timestamp Key 4	date	Like 1970-01-02T12:23:56.720+01:00
defectFixed	boolean	true false
defectType	int	1 10 2 3 4 5 6 7

		8 9
numberRepairs	int	0 1 2 3
phoneType	String	T1 T2 T3

Level A1

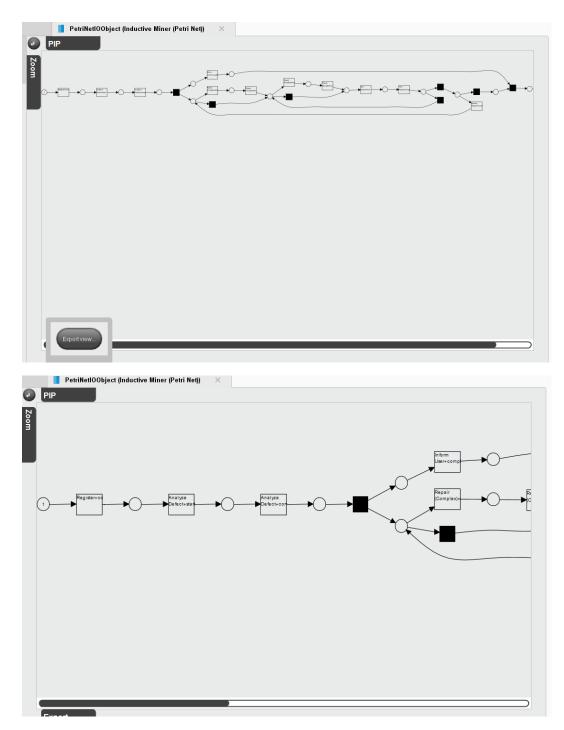






#### Level A2

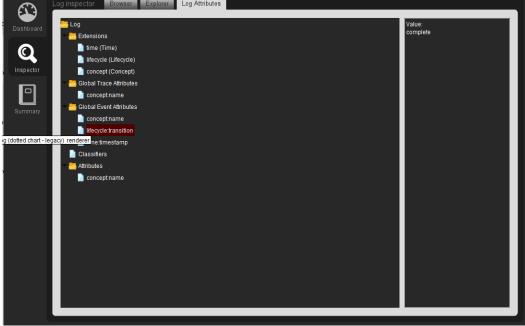




The image with zoom-in, clearly shows the correct combinations of concept names and lifecycle transitions (as defined by the classifier (Name AND Transition)) as activity names.

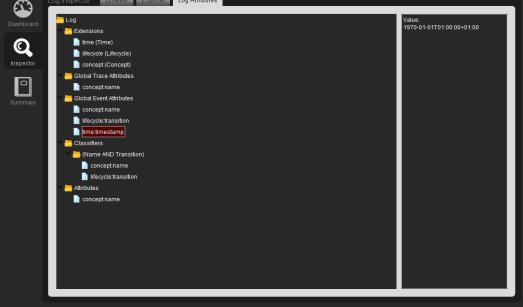
Level B1



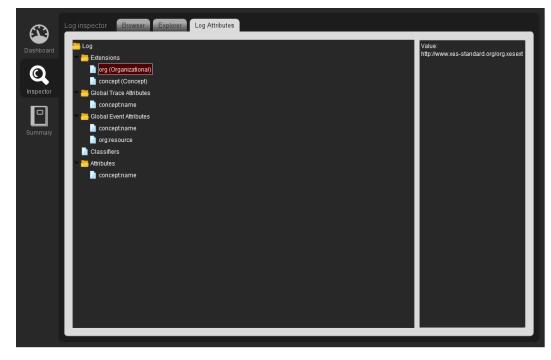


Level B2

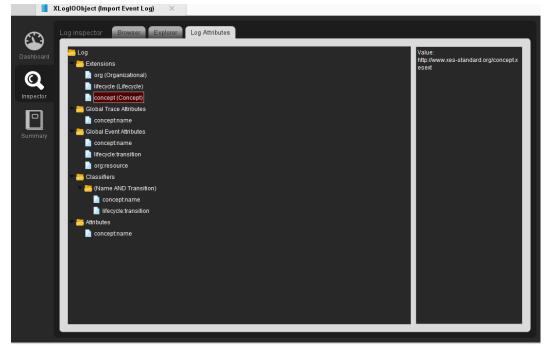




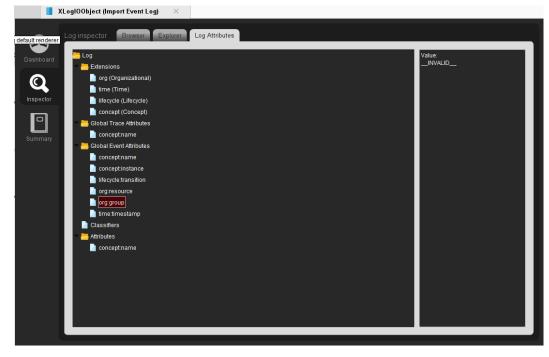
#### Level C1



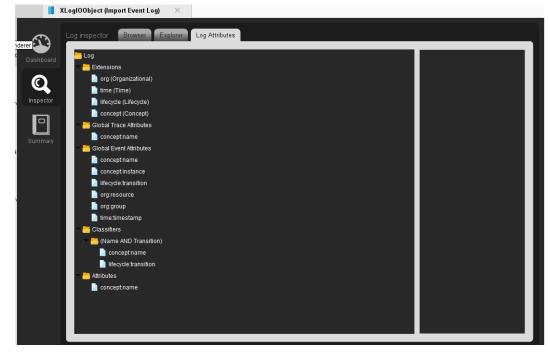
#### Level C2



#### Level D1



#### Level D2



# Export

We know from import cases, that it works for levels A1 and A2. Hence, we try the export for the same levels.

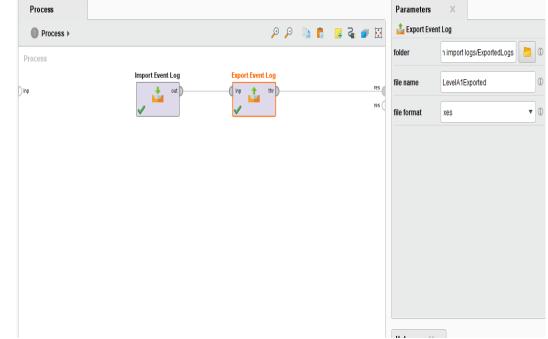
We do this by first importing the log for the given level, export that log to a file, import the log from that file again, and show that the result are the same as with the import as shown in the previous section. Steps to run export and test :

D ×

🔎 🛛 All Studio 🔻

- 1. Create a process to import a log file and export the event log 🜒 < new process\*> – RapidMiner Studio Educational 9.8.000 @ DESKTOP-DRNNUHT Eile Edit Process View Connections Settings Extensions Help 🗋 늘 🔚 🔹 🕨 🔳 Results Turbo Prep Auto Model Deployments Views: Design Find data, operators...etc Repository Operators Process Parameters × ≟ Export Event Log Process P P 🐚 🖡 📮 🏹 🕅 Liviuuulan nee minerin roceaa nee Ider leuristics Miner (Heuristics Net) 🦲 Inductive Miner (Petri Net) file name (irp 📩 thr) out 🔰 lnductive Miner (Process Tree) file format Social Network Miner (Social Network)
  - 0 xes • ( 🔒 Transition System Miner (Transition System) Fuzzy Miner (Fuzzy Model) 🕶 🛅 Export (2) 追 Export Petri net 🛓 Export Event Log 🕶 📇 Import (5) 🐴 Extract Event Log 🛓 Import Accepting Petri Nel 🛓 Import Event Log 📩 Import CPN Model 📩 Import Petri Net 🕶 🛅 Log Manipulation (8) Add Noise X Help Add Classifier to Event Log Add Artificial Start and End Even 1 Export Event Log Add Trace Attributes to Log Merge Event Logs Tags: Export Add Event Attributes to Log Synopsis Add Events to Log This operator can be used to export an event log. Sort chronologically 🕶 🛅 Streams (13) Description This operator can be used to export a event log. As log format XES. XES.GZ. MXML. and MXML.GZ Get more spendors from the Markeblace
    Missing something? Open the markeblace dialog and search for extensions which bring additional functionality to RapidMiner Studio
- 2. In the parameter window(right side of the screen, in our case), configure the output folder.
- 3. For every test click on "import event log" and change its parameter for a new event log file.

Process >		🔎 🔎 🐚 🖡	i 👍 🍓 💣 🖸	📩 Import Event Log	
Process				file port logs/Artificial/LevelA1.x	es 📒 🛛
) inp	Import Event Log	Export Event Log	res	importer Naive	• 0
				Hide advanced parameters	
				Hide advanced parameters   Help	
				Help X	
				Help × Melp × Melp × RapidProM	
				Help × Import Event Log RapidProM Tags: Import	oM XES
				Help × Import Event Log RapidProM Tage: import Synopsis This operator can be used to import a Pi	oM XES



You can later import these newly exported files and validate the contents by just running the import as we did in the import cases.

In addition, the steps are described above and only the screenshot of result will be given in the individual sections.

### Level A1

logs > xes\_certification\_import\_logs > XES certification import logs > ExportedLogs
Name
Date modified
ILevelA1Exported
11-11-2020 11:56



### Level A2

> logs > xes_certification_import_logs > XES certification import logs =	→ ExportedLogs ~ Č	, ○ Search ExportedLogs
Name	Date modified	Туре
🛐 LevelA2Exported	11-11-2020 11:59	XES File
🛐 LevelA1Exported	11-11-2020 11:56	XES File



og Sur				sa
_				
Ľ	Log Summary			
	Fotal number of process instances: <b>11</b> Fotal number of events: <b>11855</b>	04		
	(Name AND Transition)	)		
4	Event classes defined by (Name AND 1 All events Fotal number of classes: <b>12</b>			
	Class	Occurrences (absolute)	Occurrences (relative)	
	Test Repair+complete	1508	12.72%	
	Test Repair+start	1508	12.72%	
	Register+complete	1104		
		1104	9.313%	
	Analyze Defect+complete	1104	9.313% 9.313%	
	Analyze Defect+complete	1104	9.313%	
	Analyze Defect+complete Analyze Defect+start	1104 1104	9.313% 9.313%	
	Analyze Defect+complete Analyze Defect+start Inform User+complete	1104 1104 1102	9.313% 9.313% 9.296%	
	Analyze Defect+complete Analyze Defect+start Inform User+complete Archive Repair+complete	1104 1104 1102 1000	9.313% 9.313% 9.296% 8.435%	

#### Level B1

> logs > xes_certification_import_logs > XES certification import log	s > ExportedLogs 🛛 🗸 Ö	
Name	Date modified	Туре
💽 LevelB1Exported	11-11-2020 13:59	XES File
🕵 LevelA2Exported	11-11-2020 11:59	XES File
🕵 LevelA1Exported	11-11-2020 11:56	XES File



#### Level B2

logs > xes_certification_import_logs > XES certificat	tion import logs > ExportedLogs    マ ひ	Search ExportedLogs
Name	Date modified $\checkmark$	Туре
🛐 LevelB2Exported	11-11-2020 14:01	XES File
🛐 LevelB1Exported	11-11-2020 14:00	XES File
🛐 LevelA2Exported	11-11-2020 11:59	XES File
🕵 LevelA1Exported	11-11-2020 11:56	XES File



### Level C1

ogs > xes_certification_import_logs > XES certification	import logs > ExportedLogs ~	ට 🔎 Search ExportedLo
lame	Date modified	Туре
LevelC1Exported	11-11-2020 14:02	XES File
📡 LevelB2Exported	11-11-2020 14:01	XES File
LevelB1Exported	11-11-2020 14:00	XES File
LevelA2Exported	11-11-2020 11:59	XES File
LevelA1Exported	11-11-2020 11:56	XES File
Extensions org (Organizational) concept (Concept) Global Trace Attributes		
Conceptname		
Global Event Attributes		
mmary conceptiname		
🗢 🔚 Attributes		
conceptname		

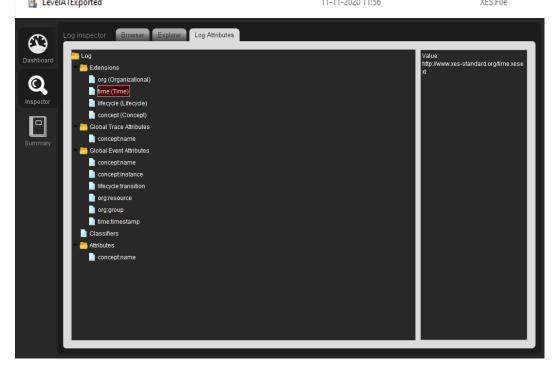
### Level C2

> logs > xes_certification_import_logs > XES certification import l	ogs → ExportedLogs v Ö	
Name	Date modified	Туре
LevelC2Exported	11-11-2020 14:04	XES File
LevelC1Exported	11-11-2020 14:02	XES File
💁 LevelB2Exported	11-11-2020 14:01	XES File
🛐 LevelB1Exported	11-11-2020 14:00	XES File
💁 LevelA2Exported	11-11-2020 11:59	XES File
💁 LevelA1Exported	11-11-2020 11:56	XES File

Log inspector Browser Explorer Log Attributes	
Log Inspector   Browset   Explorer   Log Attributes     Inspector   Inspector   Goog     Inspector   Goog   Inspector     Inspector   Goog   Inspector     Inspector   Goog   Inspector     Inspector   Goog   Inspector     Inspector   Goog (Organizational)   Interval     Inspector   Interval   Interval     Inspector   Conceptname   Interval     Interval   Interval   Interval     Interval   Conceptname   Interval     Interval   Interval   Interval </td <td></td>	

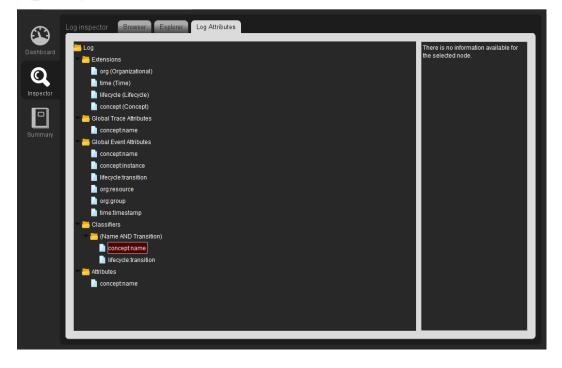
#### Level D1

logs > xes_certification_import_logs > XES certi	fication import logs > ExportedLogs ~ 🗸	・ Search ExportedLogs
Name	Date modified	Туре
S LevelD1Exported	11-11-2020 14:05	XES File
S LevelC2Exported	11-11-2020 14:04	XES File
SevelC1Exported	11-11-2020 14:02	XES File
🛐 LevelB2Exported	11-11-2020 14:01	XES File
🛐 LevelB1Exported	11-11-2020 14:00	XES File
LevelA2Exported	11-11-2020 11:59	XES File
🕵 LevelA1Exported	11-11-2020 11:56	XES File



#### Level D2

> logs > xes_certification_import_logs > XES certification import	t logs > ExportedLogs v 🖑	
Name	Date modified	Туре
💽 LevelD2Exported	11-11-2020 14:07	XES File
LevelD1Exported	11-11-2020 14:05	XES File
🛐 LevelC2Exported	11-11-2020 14:04	XES File
🛐 LevelC1Exported	11-11-2020 14:02	XES File
🛐 LevelB2Exported	11-11-2020 14:01	XES File
🛐 LevelB1Exported	11-11-2020 14:00	XES File
🛐 LevelA2Exported	11-11-2020 11:59	XES File
🛐 LevelA1Exported	11-11-2020 11:56	XES File



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**Process Mining**