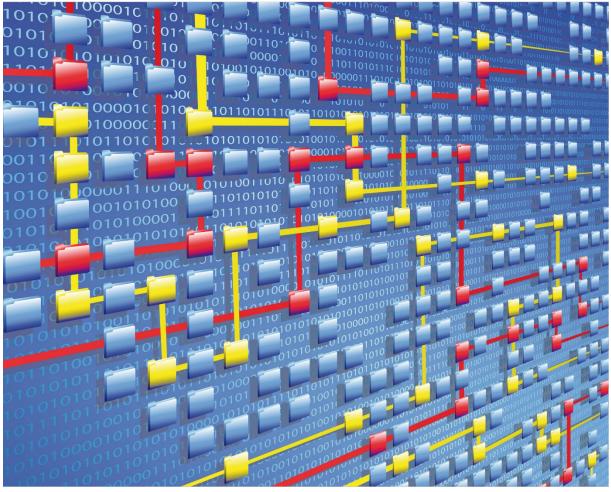
IEEE Task Force on



Process Mining

XES CERTIFICATION FOR RAPIDPROM: LIBRARY

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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

Madhavi Shankar

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

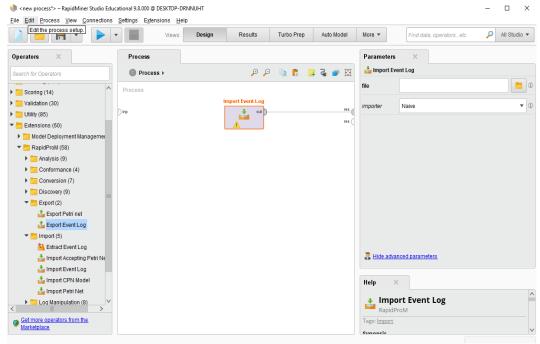
Import

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 | 🕴 🛧 🏦 🖆 🛛 | a ▼ | |
| 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



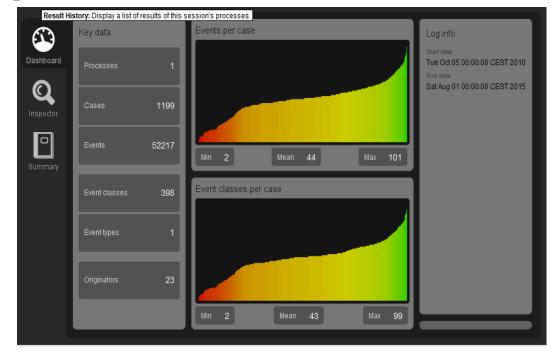
BPIC13_incidents



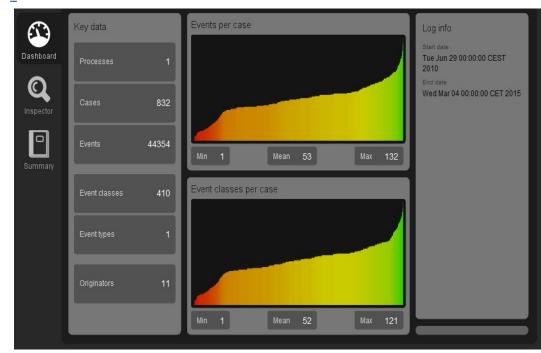
BPIC13_open_problems



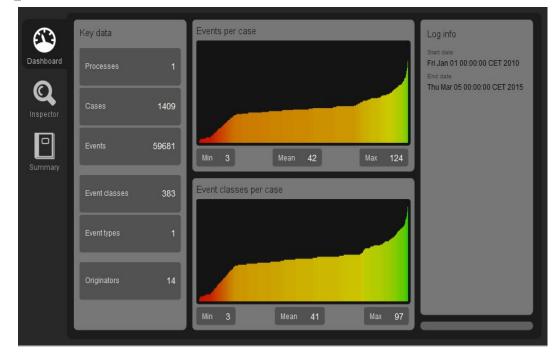
BPIC15_1



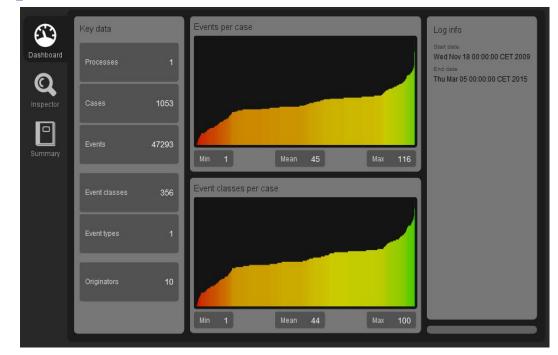
BPIC15_2



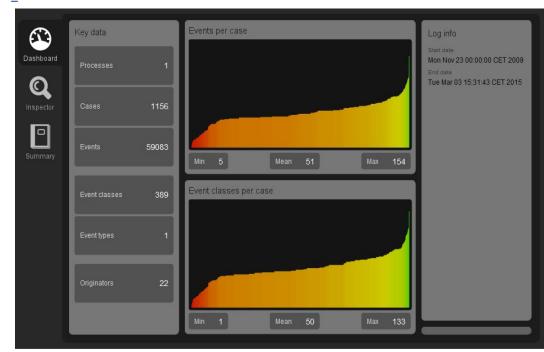


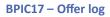






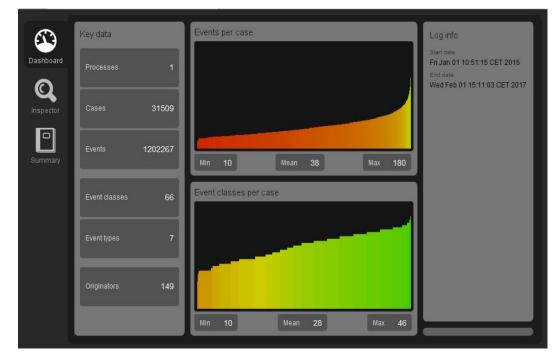
BPIC15_5







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, Key 1 , Key 2, Key 3 , Key 4 , Key 6 , phoneType, numberRepairs, {0,1,2} 2Sa!! +1 <x></x> , ITEMS:41, #1, o.1.1 |
| FlagX2 | X2 | defectFixed, defectType, Classifier (Key 1 AND Key 6), Key 2, Key 3 , Key 4 , phoneType, numberRepairs, {0,1,2} 2Sa!! +1 <x></x> , ITEMS:41, #1, o.1.1 |

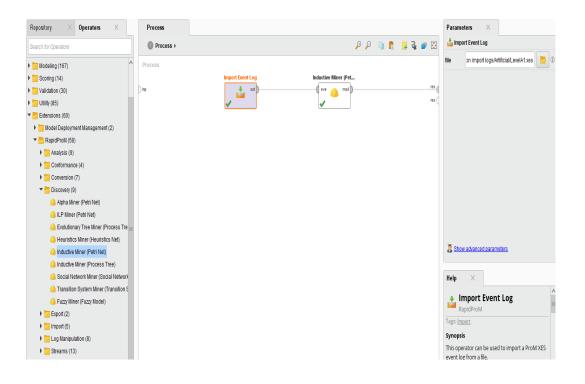
| ATTRIBUTE TYPES AND VALUES | 5 | |
|-------------------------------|--------|--|
| KEYS | TYPE | VALUES |
| concept:instance Key 2 | string | instance 1 instance 2 instance 3 instance 4 |
| concept:name (A1 and C1 logs) | string | Analyze Defect+complete Analyze Defect+start Archive Repair+complete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

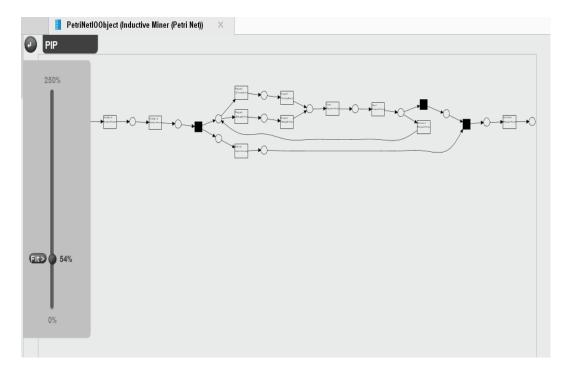
| concept:name (other logs) Key 1 | string | Repair (Simple)+complete Repair (Simple)+start Restart Repair+complete Test Repair+complete Test Repair+start Analyze Defect Archive Repair Inform User Register Repair (Simple) Repair (Complex) Restart Repair Test Repair |
|---------------------------------------|---------|--|
| 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

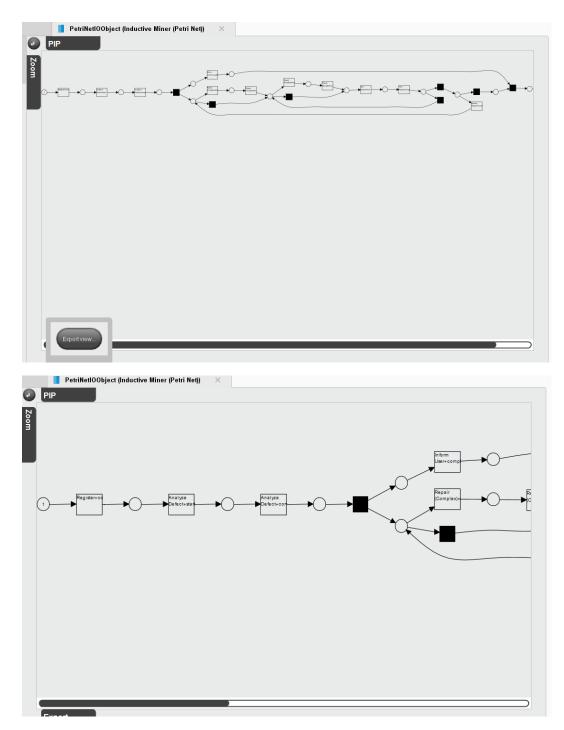






Level A2

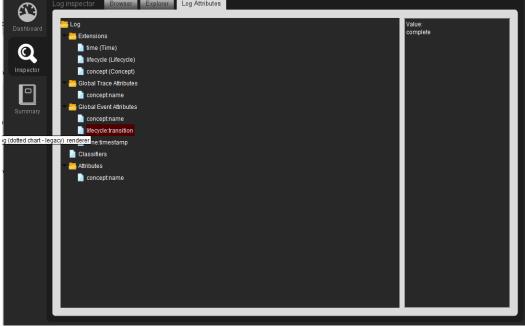




The image with zoom-in, clearly shows the correct combinations of concept names and lifecycle transitions (as defined by the classifier (Name AND Transition)) as activity names.

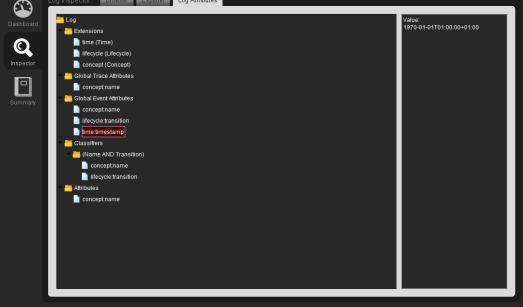
Level B1



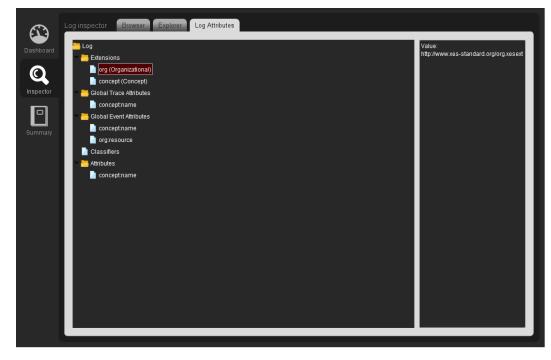


Level B2

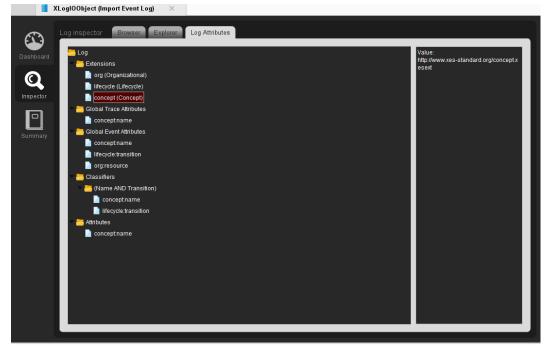




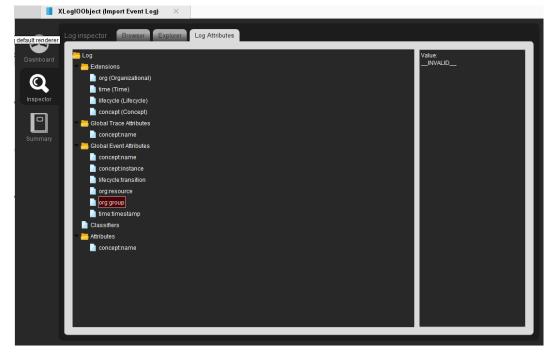
Level C1



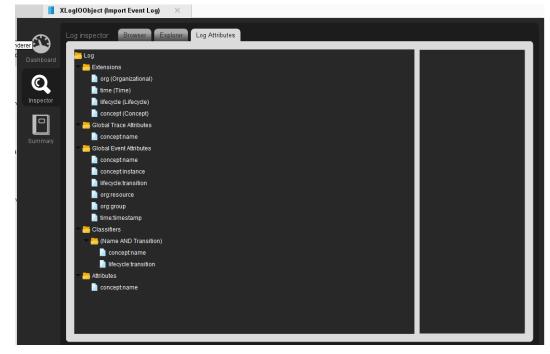
Level C2



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.

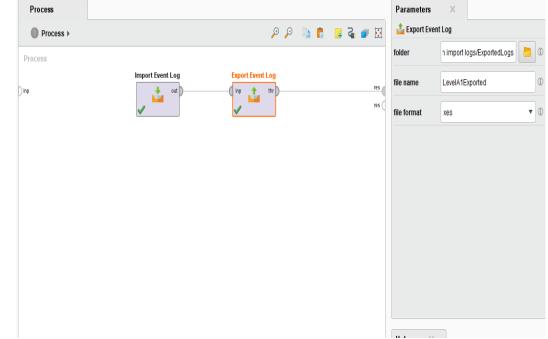
We do this by first importing the log for the given level, export that log to a file, import the log from that file again, and show that the result are the same as with the import as shown in the previous section. Steps to run export and test :

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: 11 Fotal number of events: 11855 | 04 | | |
| | (Name AND Transition) |) | | |
| 4 | Event classes defined by (Name AND 1 All events Fotal number of classes: 12 | | | |
| | 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 | | |

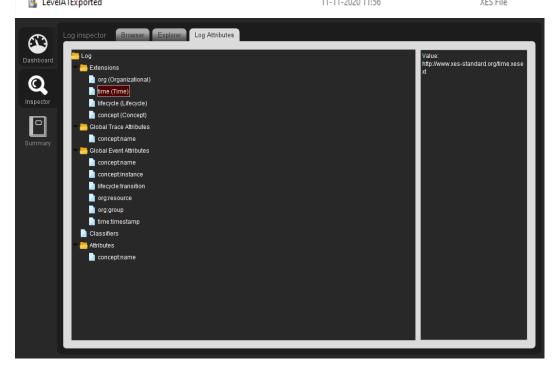
Level C2

| > 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> | |

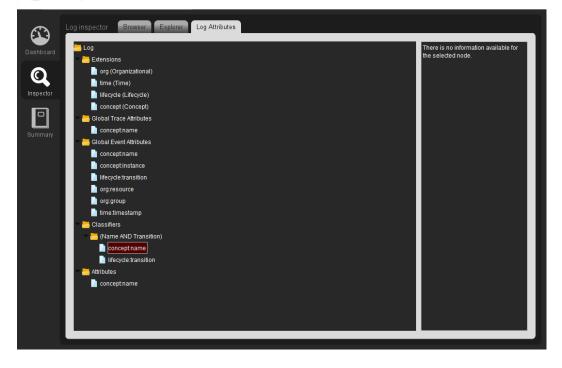
Level D1

| 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