Talend User Components: tJobInstance* - Collection

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Purpose

This collection consists of:

Component	Purpose
tJobInstanceStart	Register a job run and provide information about the previous job run. Setup the logging facility.
tJobInstanceEnd	Deregister the job run, collects KPIs and cleanup the logging setup for this job run
tJobDataRangeScanner	Collects min/max time range or values of data flows.
tJobInstanceLiveCheck	Checks the entries of the job run registry for dead or broken job instances and clean up the job registry.

These components help to track the execution of jobs in a database table.
Advantages of these components:

- Provides a unique numeric id for the job to mark all data sets processed by the job
- Start-/Stop timestamps
- Return code and error messages (collects all messages)
- Host and PID of the process running this job
- Supports incremental loading
- Supports restart capabilities
- Key figures about moved data sets
- Snapshot of the context at the start and at the end of the job
- Detects the minimum and maximum of value for a flow
- Enables the usage of Log4J in Talend jobs.

Talend-Integration

This component can be found in the palette under Management
This component provides several return values.

Parameters of tJobInstanceStart

Property	**Content**
Database Connection	Any database connection pointing to the schema with the control tables. The main table is JOB_INSTANCES holding all key information.
Job Name	Name of the job. The default is using the build-in variable jobName
Job Display Name	Human readable name of the job for reporting purposes
Process Instance Name	Name of the process instance for reporting purposes
Job Work Item	Text describing the work item (e.g. a file name or the date to process by this job)
Time range start	If the job has to precede data selected by a time range. This could be used instead of an work item to see what work this job instance do.
Time range end	See Time range start. The end of the time range to proceed.
Value range start	If the job has to precede a portion of data selected by an id range or any other value ranges.
Value range end	See Value range start. This is the end of the range.
Write Job instance ID to	To use the job instance id in the job typically a context variable will be used. Set here the context variable, which should contain the job instance id.
Read process instance id from	Jobs can combine to processes. In case of the job does not run as embedded job the process instance if can be read from a context variable.
Read ext. job instance id from	In case of need to identify a job via an external ID you can read it from this context variable.
Persist all context	If true all context variables will be written as input values in the table:

variables at start	JOB_INSTANCE_CONTEXT
Load context from job instance if (if >0)	Declare here a context variable containing a job instance id. If this ID is > 0 this job reads the context from this job instance. This provides restart capabilities to a job.
Return last instance result	Fetches the information about the last run of this job. All information are available as return values of the tJobInstanceStart component.
Last successful	The last run is the last successful run of this job (all others will be ignored)
Last mus have data inserted or deleted	The last run must have data inserted or deleted. This will be detected via the key figures. See the properties of tJobInstanceEnd.
Collecting job instances ids running after previous run	Returns as comma separated list all instance ids of all job, which was running after the last run of this job. This helps to implement incremental jobs. It is necessary to write the job instance id into every data set proceed by the job.
Only successful	Only successful job are part of the list above
Only with data	Only job which affects more the one dataset will be part of the list above
Source job names	Filter the jobs which should part of the list above. This helps to keep the list small in case of having a lot of unrelated jobs in the system.
OK Result Codes	This is a String containing a comma-separated list of all return codes, which are related to a successful run. If you want using different return codes for OK please take care the tRunJob components does not die.
Advanced Settings	
Schema	The schema (or database) will be retrieved from the connection object. In case of you want use a different schema or database, here is the place to say that.
Table for job instances	The name of the main table. This table keeps all basic information about job runs. Usually it is called JOB_INSTANCE_STATUS. In case of this name violates existing tables or naming conventions, here it can be changed.
Job instance ID is auto increment	This have to be switched on if the table use an auto increment e.g. this is supposed for MySQL.
Sequence expression	In case of auto increment is off, here set the name of the sequences for the job instance ID. This expression have to return a new value for the job instance ID: Examples: MySQL: use auto increment Oracle: `job_instance_id_seq.nextval` PostgreSQL: `nextval('job_instance_id_seq')` DB2: `NEXTVAL FOR job_instance_id_seq`
Table for job instance context	In this table the context variables will be saved. Usually it is called: JOB_INSTANCE_CONTEXT
Table for job instance counters	In this table the named counters will be stored. Usually it is called: JOB_INSTANCE_COUNTERS

Return values of tJobInstanceStart

Return value	Content
ERROR_MESSAGE	Last error message. Unfortunately this is not the error message from the actually running job. This message is build from the tRunTask component. The current TAC web service does not provide this message.
JOB_INSTANCE_ID	The job instance id used for this job run.
SOURCE_JOB_INSTANCE_ID_LIST	List of all job instance ids which are executed after the last run if this job. This way it is possible to implement incremental steering. The list can easily be used in SQL e.g. ...where job_instance_id in (“ + ((String)globalMap.get(“tJobInstanceStart_1_SOURCE_JOB_INSTANCE_

	ID_LIST") + ") ….."
JOB_START_DATE	The start date of the current job run.
PREV_JOB_EXISTS	If true means the job was running in the past at least one time.
PREV_JOB_START_DATE	If a previous job run exists (otherwise null): Contains the start date of the previous job
PREV_JOB_STOP_DATE	If a previous job run exists (otherwise null): Contains the stop date of the previous job
PREV_JOB_INSTANCE_ID	If a previous job run exists (otherwise null): Contains the ID of the previous job
PREV_JOB_TALEND_PID	If a previous job run exists (otherwise null): Contains the Talend-PID of the previous job
PREV_JOB_HOST_PID	If a previous job run exists (otherwise null): Contains the Host-PID (means the process ID of the operating system for this JVM) of the previous job
PREV_JOB_HOST_NAME	If a previous job run exists (otherwise null): Contains the name of the host where the previous job was running
PREV_TIME_RANGE_START	If a previous job run exists (otherwise null): Contains the time range start of the previous job
PREV_TIME_RANGE_END	If a previous job run exists (otherwise null): Contains the time range end of the previous job
PREV_VALUE_RANGE_START	If a previous job run exists (otherwise null): Contains the value range start of the previous job
PREV_VALUE_RANGE_END	If a previous job run exists (otherwise null): Contains the value range end of the previous job
PREV_JOB_RETURN_CODE	If a previous job run exists (otherwise null): Contains the return code of the previous job
PREV_WORK_ITEM	If a previous job run exists (otherwise null): Contains the previous work item of the previous job
PREV_RESULT_ITEM	If a previous job run exists (otherwise null): Contains the result item of the previous job
PREV_COUNT_INPUT	If a previous job run exists (otherwise null): Contains the count inserts of the previous job
PREV_COUNT_OUTPUT	If a previous job run exists (otherwise null): Contains the count outputs of the previous job
PREV_COUNT_UPDATED	If a previous job run exists (otherwise null): Contains the count updates of the previous job
PREV_COUNT_DELETED	If a previous job run exists (otherwise null): Contains the count deletes of the previous job
PREV_COUNT_REJECTS	If a previous job run exists (otherwise null): Contains the count rejects of the previous job

Properties of tJobInstanceEnd

Property	Content
Job Instance Start Component	Choose here the tJobInstanceStart component. Both components depend on each other.
Job Result	A string representation of the result of the current job. In case the job creates a file it is a good idea to put here the file path.
Time range start	If the job has to process data selected by a time range. This could be used instead of an work item to see what work this job instance do.

Time range end	See Time range start. The end of the time range to proceed.
Value range start	If the job has to process a portion of data selected by an id range or any other value ranges.
Value range end	See Value range start. This is the end of the range.
Save named counters	Counters can be named, in this case the counter value will be inserted in the table JOB_INSTANCE_COUNTERS
Save context variables at the end of the job	This way it is possible to provide the context variables as output for other jobs which are not embedded or running in different job servers or later. It is also useful for checks about the job result.
Delete previous successful job instances by work item	If checked, the component deletes all successful previous job instances with the same work item. This helps in case of the table job_instance_status will be used to keep track of the current data in the DWH and repeated job runs with the same work item replaces previous data.
Close Connection	Closes the connection used for managing the job registration
Input Counters	Counters describing the result of the job can be added here. The sum of all counters will be written in the JOB_INSTANCE_STATUS table in COUNT_INPUTS. The flag Add can be used to subtract a value instead of adding it. The name column provides the name (see Save named counters option)
Output Counters	See Input Counters. Will be used for column COUNT_OUTPUTS
Update Counters	See Input Counters. Will be used for column COUNT_UPDATED
Reject Counters	See Input Counters. Will be used for column COUNT_REJECTED
Delete Counters	See Input Counters. Will be used for column COUNT_DELETED

As Counter typically the NB_LINE return values of the input or output components can be used.

In case of the job has more the one output it is recommended to set names for particular counters to keep the distinct counter values.

Return values of tJobInstanceEnd

Return value	Content
ERROR_MESSAGE	Last error message.
RETURN_CODE	The retrieved return code of the current job
RETURN_MESSAGE	The created return message. This message contains all error messages from all components throwing an error.

Properties of tJobDataRangeScanner

Property	Content
Job Instance Start Component	Choose here the tJobInstanceStart component. Both components depend on each other.
Schema	This is necessary to have the schema column available. It is not supposed to change anything here
Configure Extraction	For every schema column you can define for which range it will be checked: Time range or Value range. The min and max values will be found even the component runs in iteration.

Return values of tJobDataRangeScanner

Return value	Content
ERROR_MESSAGE	Last error message in case of the range detection fails for a column.
TIME_RANGE_START	The min value for the measured time range.

TIME_RANGE_END	The max value for the measured time range.
VALUE_RANGE_START	The min value for the measured value range as Long or String
VALUE_RANGE_END	The max value for the measured value range as Long or String
NB_LINE_AGGREGATED	The number or rows for this component measured over all iterations

Properties of tJobInstanceLiveCheck

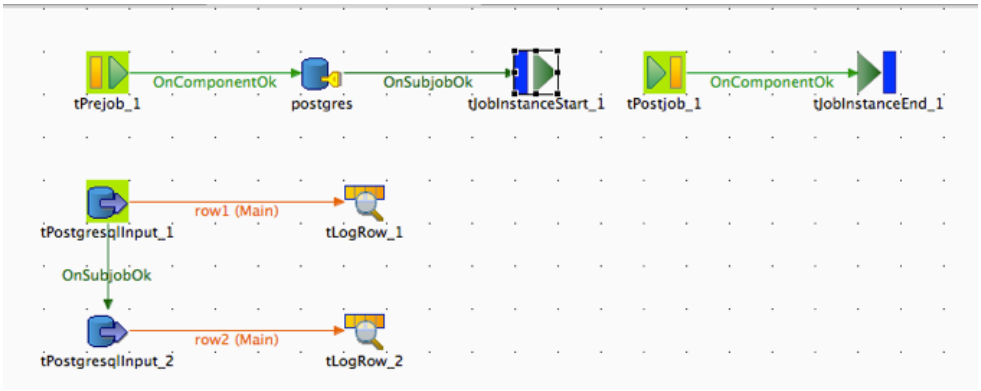
Property	Content
Database Connection	Any database connection pointing to the schema with the control tables. The main table is JOB_INSTANCES holding all key information.
Close Connection	If true the connection will be closed at the end of the component processing
Schema	This component provides a input flow providing information about cleaned job instances
Last system start	If the last system start could be determined (currently there is not platform independent implementation to get this information automatically) all older job instance starts will be cleaned.

Return values of tJobInstanceLiveCheck

Return value	Content
ERROR_MESSAGE	Error message if something in the processing of the component it self went wrong
COUNT_RUNNING_PROCESSES	The number of all running processes on the current server (regardless if this is a Talend job or not)
COUNT_RUNNING_JOB_INSTANCES	The number of as running declared job instances
COUNT_BROKEN_JOB_INSTANCES	The number of recognized broken job instances
NB_LINE	Number of rows in the data input flow

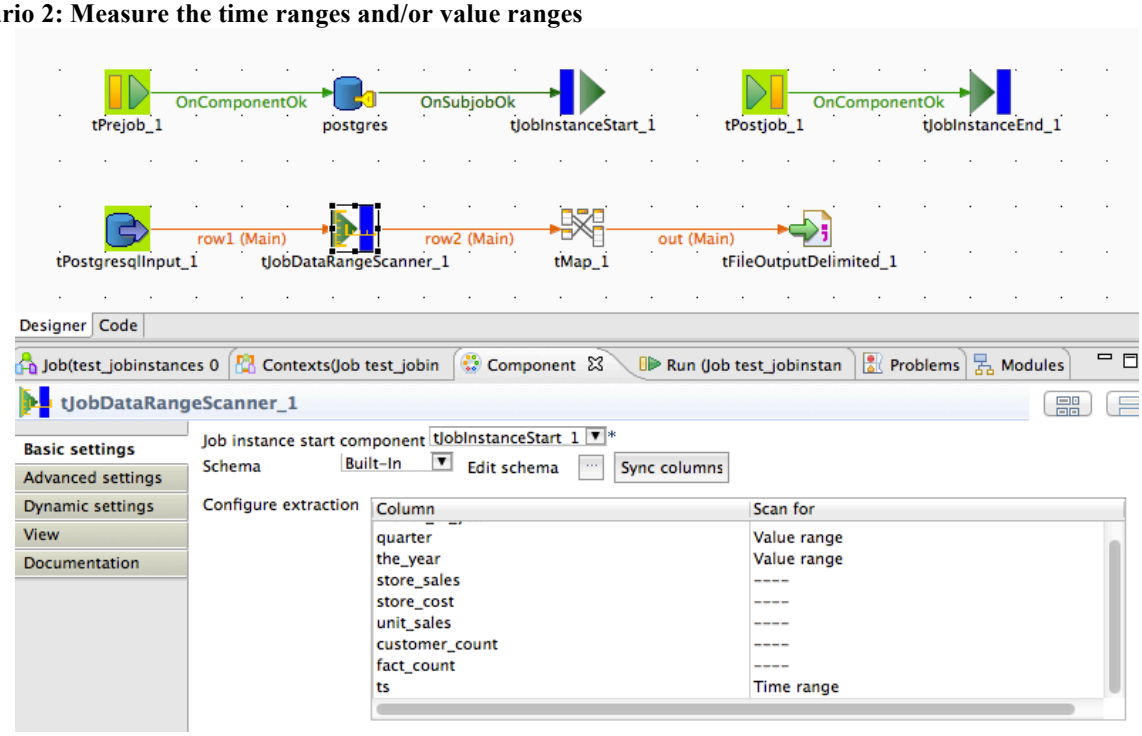
The schema is fully commented and provides the values of the JOB_INSTANCE_STATUS table for the broken instances.

Scenario 1: Simple Job monitoring



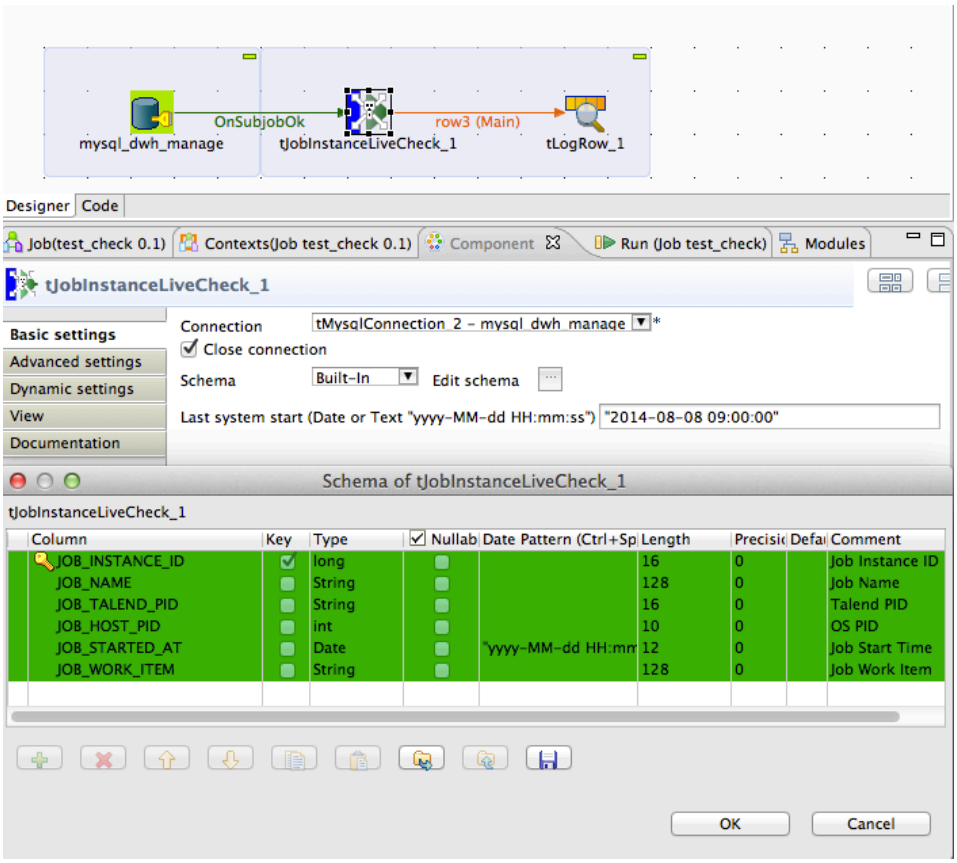
The typical usage is to use tPrejob component to trigger the tJobInstanceStart component and the tPostjob component to trigger tJobInstanceEnd component.

Scenario 2: Measure the time ranges and/or value ranges



In this Scenario the flow will be scanned for the start and end values for a time range and the value range. These values could be used to ensure the job quality or to start the next run from the previous end.

Scenario for tJobInstanceLiveCheck

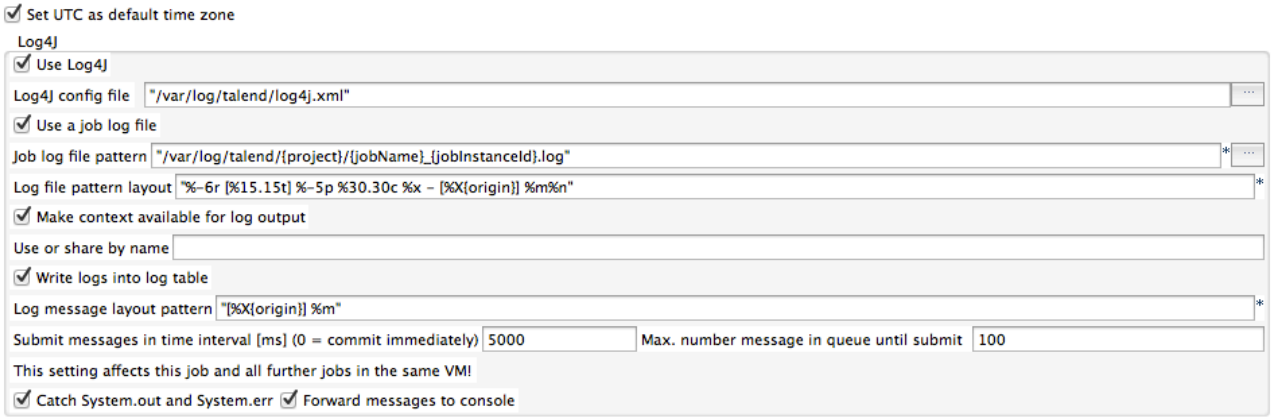


This example job shows the main purpose of the component. Such kind of job has to run frequently on every job server (servers on which the jobs run).

The component set for broken job instances the return code 999 and as return message “Process died”.
This information can be used to clean up all depending data structures.

Log4J Integration

The component contains a full-featured Log4J.
The component can initialize Log4J with a default configuration or by loading a configuration file.
A default logger called “talend” will be added to the logger hierarchy.
For every job a logger will be added with the name pattern: talend.<Project>.<Job Name>
For every instance of a job an appender will be added (and removed at the end of the job).
Each appender is an extended FileAppender and transports only log events from its own job by filtering the events by the Talend-PID.
If the option “Write logs into log table” is switch on, for every job a second appender will be added (and removed) which sends the messages to the job_instance_log table.
For the file output and the output to the table there a dedicated log formats.



The component add to every event the context variables and all default information:
These additional values will be set as MDC key-value-pairs
MDC values can be inserted in message pattern with the expression: `%X{<key>}`
In file names (log file names) the expression is simply: `{<key>}`

Variable	Log message pattern (key)
Job name	jobName
Project	Project
Context	context
Job Instance ID	jobInstanceId
Talend job instance identifier	talendPid
Talend parent job instance identifier	talendFatherPid
Talend root job instance identifier	talendRootPid
Component which causes the message	Origin
Work item	workItem
tWarn or tDie priority	Priority
tWarn or tDie error code	Code
tWarn or tDie message type	type
Job version	version
Context variables	context.<variable>
Timestamp of the job start in long format (yyyy-MM-dd HH:mm:ss.SSS)	jobStartTimestampLong
Timestamp of the job start in compact format (yyyyMMdd_HHmmss.SSS)	jobStartTimestampCompact
Job start date in long format (yyyy-MM-dd)	jobStartDateLong
Job start date in compact format (yyyyMMdd)	jobStartDateCompact

Create table scripts for the tables:

In case of MySQL it is recommended using a serial data type for the column job_instance_status.job_instance_id.
(Assuming the tables is located in the schema dwh_manage)
In the advanced settings of the tJobInstanceStart component it is possible to declare the schema and the table names.
The option Job Instance ID is auto increment allows the usage of auto increment column for job_instance_id in the table job_instance_status.

MySQL:

```
CREATE TABLE JOB_INSTANCE_STATUS (
  JOB_INSTANCE_ID BIGINT(20) UNSIGNED NOT NULL AUTO_INCREMENT,
  PROCESS_INSTANCE_ID BIGINT(20),
  PROCESS_INSTANCE_NAME VARCHAR(255),
  JOB_NAME VARCHAR(255) NOT NULL,
  JOB_PROJECT varchar(128),
  JOB_DISPLAY_NAME VARCHAR(255),
  JOB_GUID VARCHAR(100) NOT NULL,
  JOB_EXT_ID VARCHAR(255),
  JOB_INFO VARCHAR(255),
  ROOT_JOB_GUID VARCHAR(100),
  WORK_ITEM VARCHAR(1024),
  TIME_RANGE_START TIMESTAMP,
  TIME_RANGE_END TIMESTAMP,
  VALUE_RANGE_START VARCHAR(512),
  VALUE_RANGE_END VARCHAR(512),
  JOB_STARTED_AT TIMESTAMP,
  JOB_ENDED_AT TIMESTAMP,
  JOB_RESULT VARCHAR(1024),
  COUNT_INPUT INT,
  COUNT_OUTPUT INT,
  COUNT_UPDATED INT,
  COUNT_REJECTED INT,
  COUNT_DELETED INT,
  RETURN_CODE INT,
  RETURN_MESSAGE TEXT,
  HOST_NAME VARCHAR(255) ,
  HOST_PID INT,
  HOST_USER VARCHAR(128) ,
  PRIMARY KEY (JOB_INSTANCE_ID)
) DEFAULT CHARSET=UTF8;

CREATE INDEX JOB_INSTANCE_STATUS_JOB_GUID ON JOB_INSTANCES(JOB_GUID);

CREATE TABLE JOB_INSTANCE_CONTEXT (
    JOB_INSTANCE_ID BIGINT NOT NULL,      -- reference to the job instance
    ATTRIBUTE_KEY VARCHAR(100) NOT NULL,  -- context variable name
    ATTRIBUTE_VALUE VARCHAR(1024),        -- textual representation of the value
    ATTRIBUTE_TYPE VARCHAR(32) NOT NULL,  -- Java class name of the value
    IS_OUTPUT_ATTR BOOLEAN NOT NULL);     -- 0 = Input, 1 = Output

CREATE INDEX JOB_INSTANCE_CONTEXT_IDX ON JOB_INSTANCE_CONTEXT(JOB_INSTANCE_ID, ATTRIBUTE_KEY,
IS_OUTPUT_ATTR);

CREATE TABLE JOB_INSTANCE_COUNTERS (
    JOB_INSTANCE_ID BIGINT NOT NULL,     -- reference to the job instance
    COUNTER_NAME VARCHAR(128) NOT NULL,  -- name of the counter set in tJobInstanceEnd for a counter
    COUNTER_VALUE INTEGER,               -- value of the counter
    CONSTRAINT PK_JOB_INSTANCE_COUNTERS PRIMARY KEY (JOB_INSTANCE_ID, COUNTER_NAME));

CREATE TABLE JOB_INSTANCE_LOGS (
   JOB_INSTANCE_ID BIGINT NOT NULL,
   LOG_TS TIMESTAMP NOT NULL,
   LOG_LEVEL VARCHAR(10),
   LOG_NAME VARCHAR(128) NOT NULL,
   LOG_MESSAGE TEXT);

CREATE INDEX JOB_INSTANCE_LOGS_JOBID ON JOB_INSTANCE_LOGS(JOB_INSTANCE_ID);
```

PostgreSQL:

```
create table dwh_manage.job_instance_status (
   job_instance_id bigint not null,
   process_instance_id integer,
   process_instance_name varchar(255),
   job_name varchar(255) not null,
   job_project varchar(128),
   job_info varchar(512),
   job_display_name varchar(255),
   job_guid varchar(100) not null,
   job_ext_id varchar(255),
   root_job_guid varchar(100),
   work_item varchar(1024),
   time_range_start timestamp,
   time_range_end timestamp,
   value_range_start varchar(512),
   value_range_end varchar(512),
   job_started_at timestamp not null,
   job_ended_at timestamp,
   job_result varchar(1024),
   count_input integer,
   count_output integer,
   count_updated integer,
   count_rejected integer,
   count_deleted integer,
   return_code integer,
   return_message varchar(1024),
   host_name varchar(255),
   host_pid integer,
   host_user varchar(128),
   constraint job_instances_pkey primary key (job_instance_id));

create index job_instances_job_guid on dwh_manage.job_instance_status(job_guid);

create sequence dwh_manage.job_instance_id_seq start with 1;

create table dwh_manage.job_instance_context (
    job_instance_id bigint not null,
    attribute_key varchar(255) not null,
    attribute_value varchar(1024),
    attribute_type varchar(32) not null,
    is_output_attr boolean not null);

create index job_instances_context_idx on dwh_manage.job_instance_context(job_instance_id,
is_output_attr, attribute_key);

create table dwh_manage.job_instance_counters (
    job_instance_id bigint not null,
    counter_name varchar(128) not null,
    counter_value integer not null);

create index job_instance_counters_idx on dwh_manage.job_instance_counters(job_instance_id,
counter_name);

create table dwh_manage.job_instance_logs (
   job_instance_id bigint not null,
   log_ts timestamp not null,
   log_name varchar(128) not null,
   log_level varchar(128) not null,
   log_message text);

create index job_instance_logs_jobid on dwh_manage.job_instance_logs(job_instance_id);
```

Oracle:

```
CREATE TABLE JOB_INSTANCE_STATUS (
   JOB_INSTANCE_ID NUMBER(16) NOT NULL,
   PROCESS_INSTANCE_ID INTEGER,
   PROCESS_INSTANCE_NAME VARCHAR2(255),
   JOB_NAME VARCHAR2(255) NOT NULL,
   JOB_PROJECT VARCHAR2(128),
   JOB_INFO VARCHAR2(512),
   JOB_DISPLAY_NAME VARCHAR2(255),
   JOB_GUID VARCHAR2(100) NOT NULL,
   JOB_EXT_ID VARCHAR2(255),
   ROOT_JOB_GUID VARCHAR2(100),
   WORK_ITEM VARCHAR2(1024),
   TIME_RANGE_START DATE,
   TIME_RANGE_END DATE,
   VALUE_RANGE_START VARCHAR2(512),
   VALUE_RANGE_END VARCHAR2(512),
   JOB_STARTED_AT DATE NOT NULL,
   JOB_ENDED_AT DATE,
   JOB_RESULT VARCHAR2(1024),
   COUNT_INPUT INTEGER,
   COUNT_OUTPUT INTEGER,
   COUNT_UPDATED INTEGER,
   COUNT_REJECTED INTEGER,
   COUNT_DELETED INTEGER,
   RETURN_CODE INTEGER,
   RETURN_MESSAGE VARCHAR2(1024),
   HOST_NAME VARCHAR2(255),
   HOST_PID INTEGER,
   HOST_USER VARCHAR(128),
   CONSTRAINT JOB_INSTANCES_PKEY PRIMARY KEY (JOB_INSTANCE_ID));

CREATE INDEX JOB_INSTANCES_JOB_GUID ON JOB_INSTANCE_STATUS(JOB_GUID);

CREATE SEQUENCE JOB_INSTANCE_ID_SEQ START WITH 1;

CREATE TABLE JOB_INSTANCE_CONTEXT (
    JOB_INSTANCE_ID NUMBER(16) NOT NULL,
    ATTRIBUTE_KEY VARCHAR2(255) NOT NULL,
    ATTRIBUTE_VALUE VARCHAR2(1024),
    ATTRIBUTE_TYPE VARCHAR2(32) NOT NULL,
    IS_OUTPUT_ATTR NUMBER(1) NOT NULL);

CREATE INDEX JOB_INSTANCES_CONTEXT_IDX ON JOB_INSTANCE_CONTEXT(JOB_INSTANCE_ID, IS_OUTPUT_ATTR,
ATTRIBUTE_KEY);

CREATE TABLE JOB_INSTANCE_COUNTERS (
    JOB_INSTANCE_ID NUMBER(16) NOT NULL,
    COUNTER_NAME VARCHAR2(128) NOT NULL,
    COUNTER_VALUE INTEGER NOT NULL);

CREATE INDEX JOB_INSTANCE_COUNTERS_IDX ON JOB_INSTANCE_COUNTERS(JOB_INSTANCE_ID, COUNTER_NAME);

-- this table will be written from the Log4J appender in tJobInstanceStart
CREATE TABLE JOB_INSTANCE_LOGS (
    JOB_INSTANCE_ID NUMBER(16) NOT NULL,
    LOG_TS DATE NOT NULL,
    LOG_LEVEL VARCHAR2(10) NOT NULL, -- INFO, DEBUG, WARN, ERROR
    LOG_NAME VARCHAR2(128) NOT NULL,
    LOG_MESSAGE CLOB);

CREATE INDEX JOB_INSTANCE_LOGS_JOBID ON JOB_INSTANCE_LOGS(JOB_INSTANCE_ID);
```

IBM DB2:

```
--drop table dwh_manage.job_instances;
create table dwh_manage.job_instance_status (
   job_instance_id bigint not null,
   process_instance_id integer,
   process_instance_name varchar(255),
   job_name varchar(255) not null,
   job_project varchar(128),
   job_info varchar(512),
   job_display_name varchar(255),
   job_guid varchar(100) not null,
   job_ext_id varchar(255),
   root_job_guid varchar(100),
   work_item varchar(1024),
   time_range_start timestamp,
   time_range_end timestamp,
   value_range_start varchar(512),
   value_range_end varchar(512),
   job_started_at timestamp not null,
   job_ended_at timestamp,
   job_result varchar(1024),
   count_input integer,
   count_output integer,
   count_updated integer,
   count_rejected integer,
   count_deleted integer,
   return_code integer,
   return_message varchar(1024),
   host_name varchar(255),
   host_pid integer,
   host_user varchar(128),
   constraint job_instances_pkey primary key (job_instance_id));

create index job_instances_job_guid on dwh_manage.job_instance_status(job_guid);

create sequence dwh_manage.job_instance_id_seq start with 1;

create table dwh_manage.job_instance_context (
    job_instance_id bigint not null,
    attribute_key varchar(255) not null,
    attribute_value varchar(1024),
    attribute_type varchar(32) not null,
    is_output_attr smallint not null);

create index job_instances_context_idx on dwh_manage.job_instance_context(job_instance_id,
is_output_attr, attribute_key);

--drop table dwh_manage.job_instance_counters;
create table dwh_manage.job_instance_counters (
    job_instance_id bigint not null,
    counter_name varchar(128) not null,
    counter_value integer not null);

create index job_instance_counters_idx on dwh_manage.job_instance_counters(job_instance_id,
counter_name);

--drop table dwh_manage.job_instance_logs;
create table dwh_manage.job_instance_logs (
    job_instance_id bigint not null,
    log_ts timestamp not null,
    log_level varchar(10), -- INFO, WARN, ERROR, DEBUG, TRACE
    log_name varchar(128) not null,
    log_message clob);

create index job_instance_logs_jobid on dwh_manage.job_instance_logs(job_instance_id);
```

Exasol:

```
create table job_instance_status (
   job_instance_id bigint identity primary key,
   process_instance_id integer,
   process_instance_name varchar(255),
   job_name varchar(255) not null,
   job_info varchar(512) UTF8,
   job_display_name varchar(255) UTF8,
   job_guid varchar(100) UTF8 not null,
   job_ext_id varchar(255) UTF8,
   root_job_guid varchar(100) UTF8,
   work_item varchar(1024) UTF8,
   time_range_start timestamp,
   time_range_end timestamp,
   value_range_start varchar(512) UTF8,
   value_range_end varchar(512) UTF8,
   job_started_at timestamp not null,
   job_ended_at timestamp,
   job_result varchar(1024) UTF8,
   count_input integer,
   count_output integer,
   count_updated integer,
   count_rejected integer,
   count_deleted integer,
   return_code integer,
   return_message varchar(4000) UTF8,
   host_name varchar(255) UTF8,
   host_pid integer,
   host_user varchar(128) UTF8);

create table job_instance_context (
    job_instance_id bigint not null,
    attribute_key varchar(255)  UTF8 not null,
    attribute_value varchar(1024) UTF8,
    attribute_type varchar(32) UTF8 not null,
    is_output_attr boolean not null);

create table job_instance_counters (
    job_instance_id bigint not null,
    counter_name varchar(128) not null,
    counter_value integer not null);

create table job_instance_logs (
   job_instance_id bigint not null,
   log_ts timestamp not null,
   log_name varchar(128) not null,
   log_level varchar(128) not null,
   log_message varchar(10000));
```