



CloverETL for System i

CloverETL (CLI) is a robust multi-platform server application coded in Java, focused on efficient data transfers and transformations in a corporate environment.

Main application, license and created programs (called transformation graphs) are easily transferable to any other platform and database, thus providing for protection of investment and path for future expansion.

CloverETL is fundamentally expanding technological possibilities of processing various data formats on ***System i*** as well as its connectivity to different platforms and databases.

CloverETL Main Benefits

- Significantly reduces development time
- Vastly improves maintainability of developed solutions
- Eliminates data analyst – programmer bottleneck

CloverETL Main Features

- Extracts, transforms and loads data in various formats from/to any data sources and databases
- Employs visual representation of data transfers and transformations
- Transformation graphs (programs) work on any Java supporting platform and database without any need for alteration
- Includes web-based interface for administration and job scheduling
- Simple, affordable, multi-platform, easily extensible and widely usable
- Especially suitable for data export/import, data transformation and data warehouse building

System i Related Features

- Makes other platforms, data formats and SQL databases accessible for System i
- Operates directly in i5/OS and utilizes processors and other System i resources
- Graphs (programs) could be executed both through Clover instruments and i5/OS commands

System i Usage

Data Transfer

- Data transfers between DB2 and various data formats (e.g. txt, csv, xls, xml, ...)/data sources (file systems, web, ...)
- Convenient and fast data transfer between DB2 and other SQL databases (Oracle, MS SQL, Informix, ...)

Data Transformation

- Data transformation could be easily created with visual representation of transformation graph/program



- Simple and transparent debugging of data samples during transformation development. Significantly more user friendly and transparent in comparison to RPG / SQL
- Automatic parallel data processing during graph run (several times quicker than RPG), easily processes large data volumes

Ad-hoc Transfers and Migration

- Quick and simple creation of transformation graphs
- Transparent (verifiable) description of data transformation

CLI for *System i* / RPG and SQL Comparison

CLI for *System i* usage brings several important benefits when compared with traditional RPG/SQL approach.

Function	RPG + SQL	CLI for System i
CL usage	Unlimited	Synchronous/asynchronous graph processing
ILE usage	Unlimited	API CLISRV usage
SQL usage	SQL DB/2 for i5/OS	Unlimited, accessing virtually any database via JDBC
Programming language	RPG	Transformation Language (TCL) – simple and easily extendable Java-based language, similar to open format RPG
Development tools	SEU, WDSC for System i	Visual Eclipse-based development tool enables users to directly run and debug transformations
Debugging	i5/OS debugger	Convenient step-by-step transformation debugging
Development speed	Traditional RPG / SQL	Quicker and more intuitive development thanks to visual representation of transformation and its simple step-by-step debugging
Parallel processing	N/A	All components run automatically in parallel
Processing speed	Traditional RPG / SQL	Several times quicker
Data import/export	CPYFRMIMPF, CPYFRMSTMF, CPYTOIMPF and CPYTOSTMF commands , XML parser	Virtually any data format / data source
Unstructured data	N/A	Virtually any format
File System	IFS-mapped file systems	IFS-mapped file systems
Relational Database	DB/2 for i5/OS	Any relational database with JDBC driver (practically every database)
Portability	i5/OS only	Virtually any Java-supporting platform
Documentation	Manually created documentation	Automatically generated



	only	documentation in various formats, a graph itself is self-explanatory
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***CLI/System i* Integration Description**

CLI/System i integration consists of:

- i5/OS system objects
- API
- CL commands

i5/OS System Objects

Installation includes Clover library containing:

- *SBSD, *JOBQ, *JOBQ and *CLS system objects
- Main applications

CLI uses Clover subsystem and its own settings of i5/OS environment. Clover subsystem provides background for Clover Server and its transformation graphs. Clover Server is executed automatically when this subsystem is started.

API

CLI's API consists of CLISRV servicing process and allows:

- Execution of Clover Server functions
- Execution of i5/OS functions

CLISRV Servicing Process Interface

- | | |
|-----------------------|-----------------|
| • CLI_API | • CLlgetSetup |
| • CLI_help | • CLlsetSetup |
| • CLI_sanbox_list | • CLlcrtsvrstp |
| • CLI_sandbox_content | • CLlgetsvrstp |
| • CLI_graph_run | • CLlsetsvrstp |
| • CLI_graph_status | • CLlgetOutLine |
| • CLI_graph_kill | • CLlsetsvrstp |
| • CLI_server_jobs | • CLlclrOutfile |
| | • CLloutOutfile |
| | • CLloutSpool |
| | • CLlclsSetup |
| | • CLlclsSvrStp |

CL Commands

CLI contains set of commands which allow:

- Definition of constituent Clover Servers
- Execution/termination of individual Clover Servers
- API for Clover Server
- Execution and monitoring of transformation graphs



CL Commands List

CLIAPI	CLI – API
CLICHGSTP	CLI – Change Setup
CLIRTVSTP	CLI – Retrieve Setup
CLICRTSVR	CLI – Create Server Setup
CLICHGSVR	CLI – Change Server Setup
CLIRTVSVR	CLI – Retrieve Server Setup
CLISTRGRF	CLI – Start Graph
CLIGRFMON	CLI – Graph Monitor
CLISTRSVR	CLI – Start Server
CLIRUNSVR	CLI – Run Server
CLIENDSVR	CLI – End Server

Graph Execution and Monitoring

CLISTRGRF command is used to run transformation graphs. Property can be set so as to await finishing the graph or not.

Synchronous processing

CLISTRGRF command is set to wait until graph flow ends. The command itself terminates when Clover Server finishes graph processing. In that event CALL command is used for graph execution. In case of an error the command is terminated with the *ESCAPE message, which can be later monitored.

Asynchronous processing

Unless set otherwise, CLISTRGRF command terminates immediately after transformation graph is started in Clover Server. At the same time batch process is started in Clover subsystem to monitor running graphs. Graph execution works in a similar fashion to batch SBMJOB CMD(CALL). Batch process is terminated when graph flow ends, either „normally“ or „abnormally“, depending on outcome of graph flow. Message about this is-event is sent to a specified message queue.



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Appendix: Examples of interface commands

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          CLI - Change Server Setup (CLICHGSVR)

Type choices, press Enter.

CLI server name . . . . . > AEGIS003      Name
Host name . . . . .      'localhost'
-----
Port . . . . .          '8080'          *SAME, *DEFAULT
Default user . . . . .  'clover'
New password . . . . .
New password (to verify) . . . .

                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```

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          CLI - Start Graph (CLISTRGRF)

Type choices, press Enter.

Sanbox . . . . . _____
Graph . . . . . _____
-----
Wait for end . . . . .  *YES          *YES, *NO
Message queue . . . . . *USRPRF      Name, *USRPRF, *WRKSTN, *NONE
  Library . . . . . _____ Name, *LIBL, *CURLIB

          Additional Parameters

CLI server name . . . . .  *DEFAULT      Name, *DEFAULT
User . . . . .            *SETUP
Password . . . . .

                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys

```



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CLI - API (CLI-API)

Type choices, press Enter.

API name . . . . . SANDBOX_CONTENT
Sanbox . . . . . _____

Graph . . . . . _____

Run time Config . . . . . *DEFAULT

RunID . . . . . _____ Character value
Return type . . . . . STATUS_TEXT
Wait for status . . . . . *NONE
Wait time out . . . . . 60000 1-60000, *NONE
Output . . . . . * _____ *, *PRINT, *OUTFILE
File to receive output . . . . . _____ Name
Library . . . . . *LIBL Name, *LIBL, *CURLIB

Output member options:
Member to receive output . . . *FIRST Name, *FIRST
Replace or add records . . . *REPLACE *REPLACE, *ADD

Additional Parameters

CLI server name . . . . . *DEFAULT Name, *DEFAULT
User . . . . . *SETUP
Password . . . . . _____

Bottom

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

```