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Part 2: Detailed analysis

Legacy Check – Example report

LVS/400 · Muster Logistik GmbH (fictional)

Analysis of an RPG and COBOL application with Db2 on IBM i
(AS/400)

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Fictional example: company, application and all figures are invented. Structure and depth match a real Legacy Check.

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1 Assignment and approach

The goal of the Legacy Check was a sound basis for deciding the future of LVS/400. It was based on the complete source libraries (state of 1 September 2026, exported as text files), analyses of the database descriptions and object usage, the system and authority configuration, and two interviews. The code analysis was AI-assisted in an isolated environment; all findings were reviewed manually. No live data was processed.

Scope

- Analysis of the complete source libraries and database descriptions (no live data)
- AI-assisted code analysis with the right model for each task and proven prompts, all findings reviewed by experienced developers
- Two interviews: business department (warehouse and dispatch) and IT
- Review of system, authorities, operations, interfaces and licences
- Results presentation (online, 60 minutes) and this report

Not included: Not included: load tests, penetration test, review of the EDI converter and the route planning software, hardware and licence quotes.

Goals

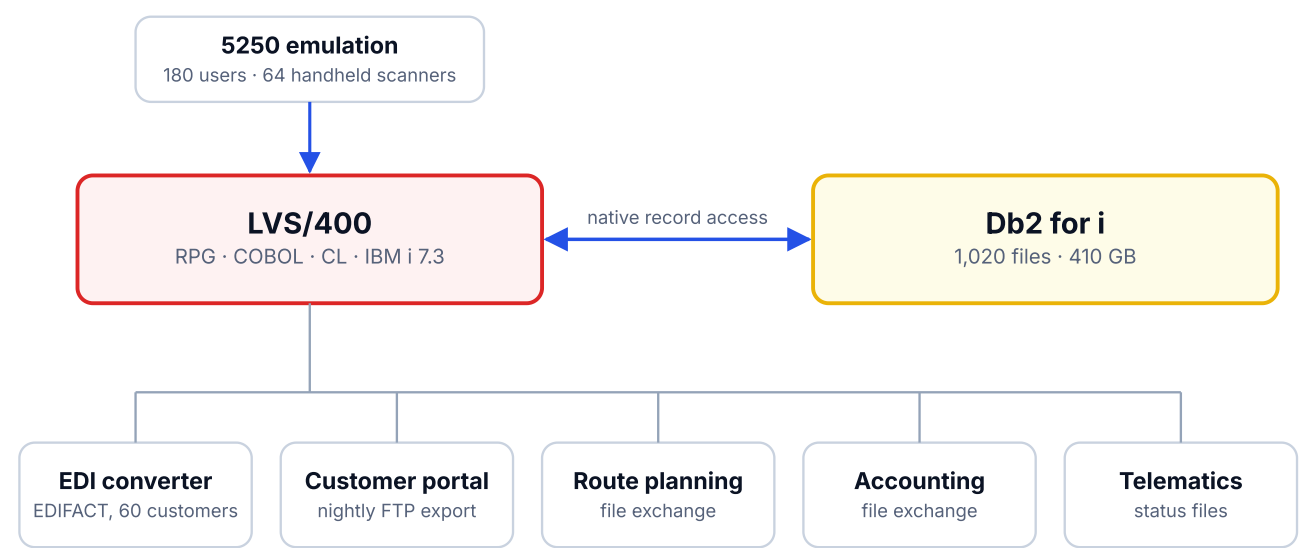
- Assess staffing and operational risks
- Meet customer demands for real-time interfaces
- Find a viable path for the next 10 years – without a big bang

Fixed price €2,499 net · Completed within 2 calendar weeks

2 System overview

Muster Logistik GmbH (fictional) – Contract logistics and freight forwarding company with 320 employees, four sites and three warehouses with a total of 42,000 pallet spaces. Core system for order intake, warehouse management, picking, transport planning, shipment tracking and customer-specific billing for around 60 contract logistics customers.

LVS/400 runs entirely on one IBM i system: programs, screens and database live on the same server. Users and handheld scanners work through 5250 terminal emulation. External systems are connected only through nightly file exchanges – there are no real-time interfaces.



Language / platform	RPG III, RPG IV (ILE), COBOL/400 and CL on IBM i 7.3, Power8 server
Size	1,051 programs, approx. 640,000 lines of code, 312 screens (5250)
Database	Db2 for i · 1,020 physical and 1,870 logical files, mostly described with DDS, 410 GB
Interfaces	EDIFACT with 60 customers via an EDI converter, customer portal via nightly FTP export, route planning and financial accounting via file exchange
Usage	180 users at 4 sites, 64 handheld scanners with terminal emulation
Development	2 in-house RPG developers (aged 61 and 64); source code without version control; no automated tests
Operations	System administration by an external IBM i partner; backup to tape, disaster recovery site under contract
Documentation	Help texts in the screens, database description from 2009

3 Code analysis

The code has grown over 31 years and its business logic is very consistent. It reflects several generations of development, though – from RPG III with indicators and GOTO to modern free-format RPG. The customer-specific billing is spread across hundreds of programs and contains many hard-coded special rules.

Source code by language

LANGUAGE / TYPE	USED FOR	LINES OF CODE	SOURCE MEMBERS	ASSESSMENT
RPG III (OPM)	Oldest core programs, billing	142,000	118	outdated
RPG IV, fixed format	Most of the business logic	298,000	486	common, hard to read
RPG IV, free format	Newer programs since 2016	61,000	94	up to date
COBOL/400	Freight calculation, customs module	58,000	41	outdated
CL	Job control, file exchange	46,000	312	operations control
DDS (screens, print files)	312 screens, 96 print layouts	35,000	408	user interface
Total		640,000	1,459	

Metrics

METRIC	VALUE	ASSESSMENT
Programs with GOTO and indicator logic	38%	hard to read and hard to convert
Duplicated code	16%	below 5% would be usual
Hard-coded customer rules	1,240 places	new customers require program changes
Automated tests	none	changes are risky
Programs unchanged for over 10 years	44%	stable, but nobody knows them in detail any more
Programs not called in 3 years	approx. 17%	can be dropped before a migration

4 Database analysis

The data is complete and well maintained – a great asset. However, the database is mostly described with DDS and has no foreign keys: only the programs keep the relations between files consistent. For a migration, the data model therefore has to be reconstructed from the code and documented first.

Physical / logical files	1,020 / 1,870
Described with DDS / SQL	96% / 4%
Referential integrity	none – only in the programs
Database size	410 GB
Journalled files	62%

LARGEST FILES	RECORDS	SIZE
Shipment history	410 m	148 GB
Stock movements	260 m	96 GB
Billing lines	120 m	54 GB
Status messages	380 m	41 GB

Data quality

- 214 date fields in 6-digit format with a separate century flag
- 312 text fields without a character set ID (CCSID 65535) – must be mapped individually during the data migration
- 23 files with a separate member per customer – complicates access via SQL
- approx. 18,000 stock movements without a valid article reference (orphaned records)

5 IT security

HIGH	IBM i 7.3 without standard support (since 09/2023); paid extended support was not purchased.
HIGH	Terminal sessions (Telnet) and FTP unencrypted – including over the warehouse Wi-Fi.
HIGH	38 of 290 user profiles with full access to all objects (*ALLOBJ).
MEDIUM	System security level 30 instead of the recommended level 40.
MEDIUM	11 profiles with password equal to user name; no security audit journal active.
LOW	Backup tapes are stored off-site unencrypted.

6 Dependencies and licences

COMPONENT	VERSION	STATUS	ACTION
IBM i	7.3	standard support ended 09/2023	7.5 or 7.6 (phase 1)
Server	Power8	hardware maintenance ends 2027	current hardware or hosted operation
RPG III / COBOL/400	–	hardly any developers left	replacement (option C)
5250 screens (DDS)	–	long training time, not mobile	web user interface
EDI converter	3.x (Windows)	maintained, service contract	keep, connect via interface
Route planning	third-party product	maintained	keep, connect via interface
Telnet / FTP	–	unencrypted	TLS and SFTP

7 Operations and infrastructure

- Very high availability: two unplanned outages in five years
- Daily backup to tape; disaster recovery site under contract, last test in 2022
- No separation of test and production: changes are tried out in a test library on the same system
- Source code without version control; the change history exists only in comment lines

8 Knowledge and documentation

- Two in-house developers know the system completely; retirement in 2027 and 2029
- An estimated 380 billing rules, approx. 60 of them documented
- Database description from 2009 and help texts in the screens – no other documentation
- The search for RPG developers has been unsuccessful for 14 months

9 Traffic-light rating

Stable core, acute staffing risk

LVS/400 is extremely stable and maps the processes precisely – especially the customer-specific billing. The IBM i platform is being developed further by IBM and is not the problem. The problems are staffing and interfaces: the knowledge sits with two developers close to retirement, and without real-time interfaces the company is already losing business. We recommend first placing interfaces in front of the legacy system and then replacing the modules step by step.

AREA	RATING	REASON
Knowledge & staffing	● Red	Both RPG developers retire in 2027 and 2029; no successor found; approx. 60 of 380 billing rules documented.
Integration & interfaces	● Red	No real-time interfaces, only nightly file exports; two tenders lost in 2026 as a result.
IT security	● Amber	Terminal and FTP unencrypted; 38 profiles with full access to all objects; security level 30 instead of 40.
Operations & infrastructure	● Amber	Very high availability; but IBM i 7.3 without standard support, hardware maintenance ends in 2027.
Maintainability & code quality	● Amber	Consistent business logic, but 22% RPG III, much GOTO and indicator logic, 1,240 hard-coded customer rules.
Database & data	● Amber	Well-maintained data; but no referential integrity, 6-digit date fields, fields without a character set ID.
Technology outlook	● Amber	IBM i is being developed further, but the application hardly uses it: 5250 screens, DDS, no APIs.
Business fit	● Green	Fully covers warehouse, transport and billing; very stable; billing as a strength.

10 The five biggest risks

NO.	RISK	RATING	ACTION
R1	Loss of knowledge through retirement Both RPG developers retire in 2027 and 2029. Knowledge of around 380 billing rules and 1,051 programs is barely documented.	CRITICAL	Start the knowledge transfer now, document core programs, external IBM i support as a bridge.
R2	Missing real-time interfaces Customers demand shipment status and order intake via API; today there are only nightly file exports.	HIGH	REST interfaces in front of LVS/400 for shipment status and order intake.
R3	Platform at end of support IBM i 7.3 no longer has standard support; hardware maintenance for the Power8 server ends in 2027.	HIGH	IBM i 7.5 or 7.6 on new hardware or hosted – as a bridge for the migration period.
R4	Unencrypted connections, excessive rights Terminal sessions (Telnet) and FTP are unencrypted, including over the warehouse Wi-Fi; 38 profiles have full access.	HIGH	TLS for terminal sessions, SFTP, authorisation concept, security level 40.
R5	Customer rules hard-coded 1,240 places with hard-coded customer rules; every new customer requirement needs a program change.	MEDIUM	Document the rules and map them as configuration in the new system.

11 Options in detail

Effort and duration estimated without AI. Our AI-assisted development reduces time and cost by the range shown; the roadmap already includes AI.

A · Secure the platform and the knowledge

Without AI: **90–120 PD · 4–6 months** · Saving with AI: **30–40%** · Assessment: **Essential as a bridge**

Upgrade to IBM i 7.5 or 7.6 (new hardware or hosted), encryption and authorities, disaster recovery test, Git for the source code, documentation of the core programs.

Advantages

- + Quickly reduces operational and security risks
- + Secures knowledge while it is still available

Disadvantages

- Solves neither staffing nor interface problem
- Additional hardware or hosting costs

B · Modernise on IBM i

Without AI: **750–950 PD · 31–40 months** · Saving with AI: **55–65%** · Assessment: **Possible, but the staffing problem remains**

Convert RPG III and COBOL to free-format RPG, move the database to SQL, web user interface and interfaces directly on IBM i.

Advantages

- + Keeps using the stable platform
- + Lower risk for the data migration

Disadvantages

- The RPG skills shortage remains
- Dependence on platform and licences

C · Add interfaces first, then replace module by module recommended

Without AI: **1,040–1,310 PD · 40–45 months** · Saving with AI: **40–50%** · Assessment: **Recommended (after option A)**

First REST interfaces with Spring Boot (Java) in front of LVS/400, then a new web application with Angular and PostgreSQL, module by module; LVS/400 runs in parallel and shrinks step by step.

Advantages

- + Immediate customer benefit through interfaces
- + Widely used technology – developers available
- + Manageable risk per module, no big bang

Disadvantages

- Highest total effort
- Longer parallel operation of two worlds

D · Standard software for warehouse and forwarding

Without AI: **high (plus licences) · 22–30 months** · Saving with AI: **approx. 20%** · Assessment: **Only sensible for parts**

Replacement by a standard warehouse management system and a freight forwarding software.

Advantages

- + Vendor maintenance, industry features included

Disadvantages

- Customer-specific billing only approx. 60% covered
- Two systems from two vendors

12 Recommendation and roadmap

We recommend first securing the platform and the knowledge (option A), then placing interfaces in front of LVS/400 and replacing it module by module (option C). The interfaces benefit customers immediately and form the foundation of the new application.

PHASE	TIMEFRAME	CONTENT	EFFORT
Phase 1: Bridge and security	Months 1–4	IBM i 7.5 or 7.6, encryption and authorities, disaster recovery test, Git, start of the knowledge transfer	60–80 PD
Phase 2: Interface layer	Months 3–8	REST interfaces for shipment status and order intake, real-time customer portal, document data model and billing rules	110–140 PD
Phase 3: Modular replacement	Months 8–26	Warehouse with mobile data capture, order intake, dispatch, billing; data migration to PostgreSQL per module	420–520 PD
Phase 4: Shutdown	Months 26–30	Take over remaining functions, archive legacy data in an audit-proof way, switch off IBM i	40–60 PD

All four phases: 630–800 PD over approx. 30 months with AI – approx. 1,130–1,430 PD without AI. Accuracy ±25%. Hardware, hosting and licences not included.

Next steps

1. Discuss the results with management, IT and warehouse management
2. Commission phase 1 and start the knowledge transfer of both developers immediately
3. Select pilot customers for the new shipment status interface
4. Detailed planning and fixed-price proposal for phase 2

13 Glossary

PD	Person-day (8 hours)
IBM i / AS/400	IBM's operating system and platform for business applications; formerly AS/400
RPG	Programming language of IBM i; RPG III is the older, RPG IV (ILE) the newer form
5250	Terminal user interface of IBM i ("green screen")
DDS	Older description language for IBM i files and screens
CCSID	Identifier of a data field's character set
Strangler fig pattern	Step-by-step replacement: new modules gradually take over functions of the old system

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