



# Legacy Modernization: What is Legacy Code

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How to deal with an old codebase





## What is legacy code?

In this lesson we are going to understand what is legacy code and see some real-world examples.





# What is legacy code?

What is legacy code?

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Examples of legacy code

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## What is legacy code?

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## What is legacy code?

There are many possible definitions of legacy code depending on technical, business and practical aspects.





## What is legacy language?

- One way some code could be legacy code is that it is written in a legacy language
- We could say that a language is legacy if it is used primarily to maintain existing systems, rather than to create new ones





## What is legacy code?

- A software can be legacy code, even when written in a non-legacy language
- It is more difficult to provide a simple definition of this case







## What is legacy code?

- It happens when a project is forced into maintenance mode because developing new features is too risky, costly or nobody knows how to do it
- You have code that does something valuable but the value is hard to use fully because of technological issues





## What is legacy code?

- It runs on an old platform (OS, hardware, etc.)
- It uses an old paradigm (console, desktop, etc.)
- It is based on an unmaintained framework (e.g. ANTLR 2, etc.)
- ...





## What is legacy code?

We have seen examples of:

- obsolete business practices, such as still using mainframes or not using cloud services, which lead to high initial and/or maintenance costs
- obsolete technical practices, such as using language or framework no more developed







## How legacy code happens

What is legacy code?

**How legacy code happens**

Examples of legacy code





## How legacy code happens

Legacy code is created by a mix of obsolete business and technical practices





## How legacy code happens

Legacy code was born when the rest of the world moved on to new designs and practices, while your company got stuck on the old ones and you were not able to keep up with the rest.





## How legacy code happens

This change happened gradually. New systems initially had some advantages but they lacked important features and were unproven.







## How legacy code happens

Some new systems showed promise but failed.

Some new systems instead improved and build upon their initial advantages. So they took more development effort, leaving what are now legacy systems at a disadvantage.





## How legacy code happens

It is not obvious which languages or practices will become obsolete in the future. Something could work out for decades and then slowly become unused.

You could make reasonable choices at every step and still end up in a legacy situation.





## How legacy code happens

- The status of legacy code is context-dependent, not absolute
- Some language may be legacy in the wider world, but still actively used in one industry
- Some languages might slowly become legacy language





## How legacy code happens

C++ is not currently legacy in embedded or system programming.

However, it is no more used in many other applications because of productivity and safety issues. Even the NSA suggests moving from C and C++:

[https://media.defense.gov/2022/Nov/10/2003112742/-1/-1/0/CSI\\_SOFTWARE\\_MEMORY\\_SAFETY.PDF](https://media.defense.gov/2022/Nov/10/2003112742/-1/-1/0/CSI_SOFTWARE_MEMORY_SAFETY.PDF)





## How legacy code happens

It might be replaced by languages such as Rust in the future.

It is difficult to say now: the language has not evolved for years, but it has seen changes more recently.





## How legacy code happens

- There are many ways something can become legacy code
- Whether something becomes legacy can depend as much on the rest of the industry as on yourself





## How legacy code happens

- Not all old code is legacy code
- For example, Windows codebase is very old. It had originally an old design. It is not legacy code, because Microsoft spent billions of dollars to update the code, kept up with new practices and even developed some of them





## How legacy code happens

However, many Windows desktop apps became legacy code because developers could not keep up with the changes that Windows made to its own APIs.







## How legacy code happens

Unless you are Microsoft, legacy code can happen to you, because of a changing environment and decisions made by your ecosystem.





## How legacy code happens

A project might become legacy code because your company has changed.

For example, your organization moved to the cloud except for one custom system that you could not find a cloud equivalent for. That system is now legacy.

*It works, but it does not work for the new you.*





## How legacy code happens

You had the best FORTRAN developers in the world, but they have now retired. So your code is becoming legacy because you cannot find any good FORTRAN developer.







## What is legacy code?

What is legacy code?

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Examples of legacy code





## Examples of legacy code

- There are many examples of legacy applications
- Let's see some that we encountered in our work





## Examples of legacy code

Old platforms:  
Mainframe,  
Unsupported OSes,  
etc.

Old paradigm  
software: legacy  
databases, Excel  
plugins etc.

Old approach:  
standalone projects,  
desktop apps

Cobol, PL/1, VB6,  
etc.

Legacy Practices

Legacy  
Language

Legacy Code





## Examples of legacy code

We are going to see examples for each group.







## Examples of legacy code

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## Examples of legacy code

For example, mainframe code is largely legacy code, because most companies nowadays use new paradigms for technical and business reasons.





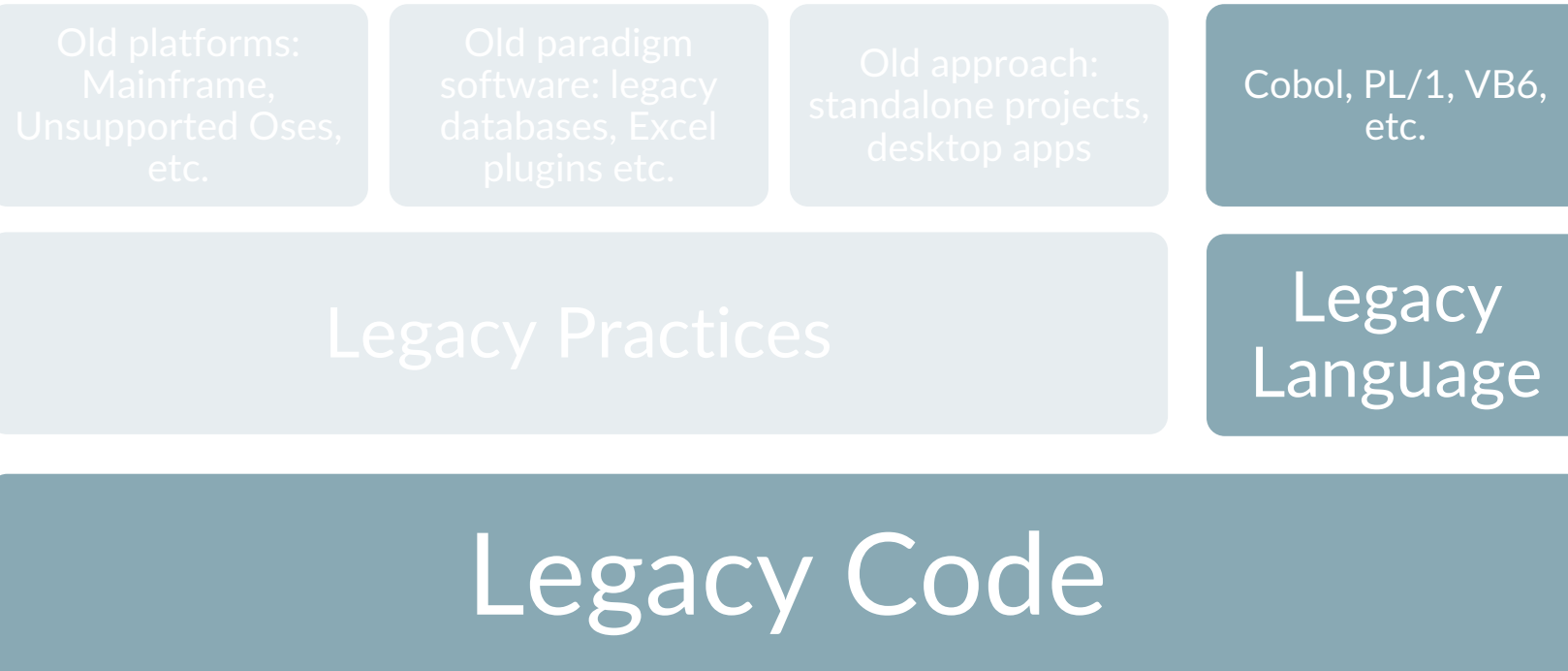
## Examples of legacy code

- A financial company needed to move from mainframe computers to standard x86 servers
- This required a complex multi-year project. We helped them with one step: developing a transpiler from RPG to Java





## Examples of legacy code





## Examples of legacy code

We worked with a consulting company specializing in legacy modernization. They have their own platform to help the company move from old systems.

We created for them a PL/1 to Java transpiler. They added services and support to the company.





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## Examples of legacy code

- Microsoft Excel is a staple of the financial industry. An advanced feature of the software is that it allows automation and programming using a simple language (VBA)
- Third-party companies rely on this familiarity to build plugins that use VBA to bring added value or even just their own platform that supports VBA





## Examples of legacy code

This situation creates legacy code because companies' products evolve so much that need a language that is better than VBA in some aspects, like performance or managing larger projects.







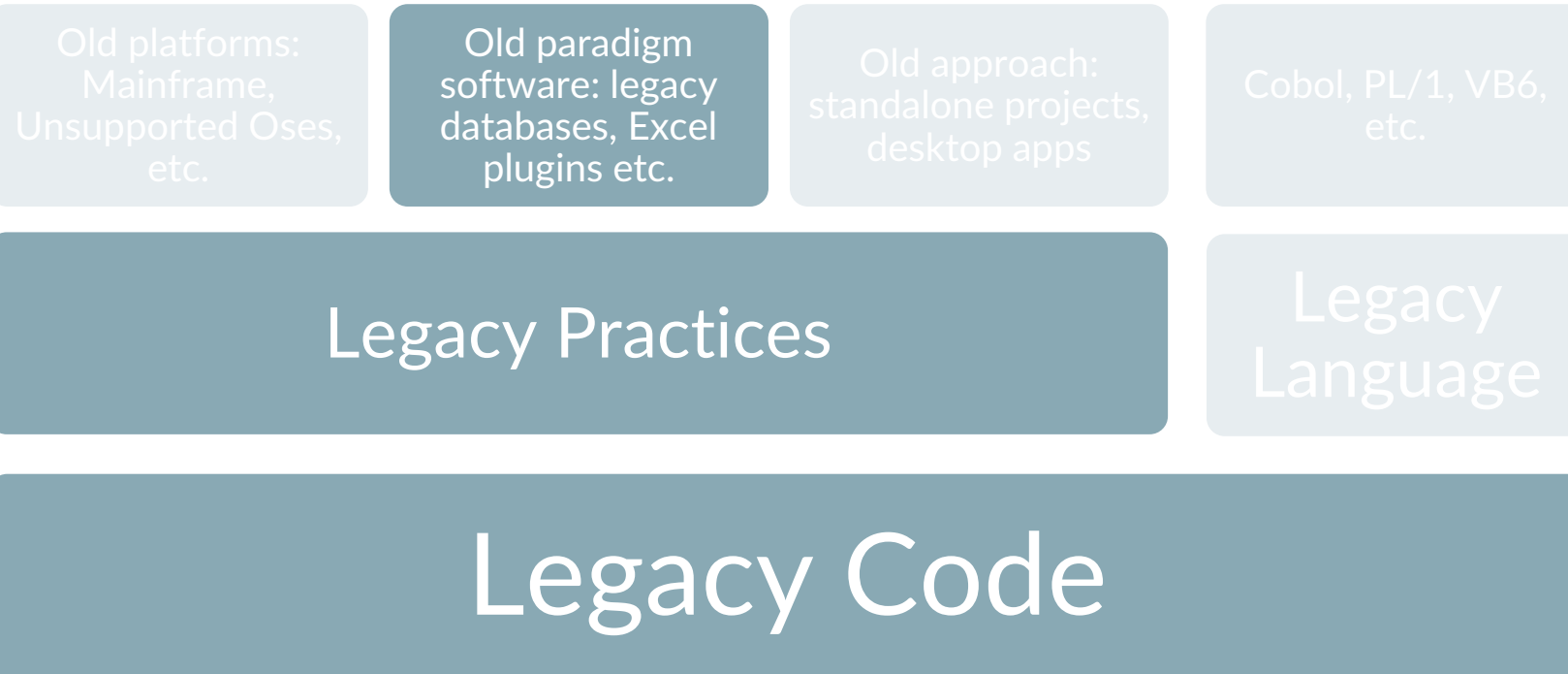
## Examples of legacy code

- We helped many companies deal with these issues
- For one, some years ago, we developed a transpiler from VBA to C++





## Examples of legacy code





## Examples of legacy code

Another example of migration is to migrate their existing parser from ANTLR v2/v3 to v4.





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## Examples of legacy code

- SQL is also a standard programming language used in many software
- However, many software implements it with some differences. For instance, Azure SQL is different from Snowflake SQL or Oracle SQL





## Examples of legacy code

SQL is also used in many ways. Some use it just for standard data manipulation. Others take advantage of procedural functionality to create full programs.

So a certain SQL dialect can be a legacy language or part of a legacy application in some cases. This is even though it is still widely used.





## Examples of legacy code

- Several companies have the issue of migrating from procedural PL/SQL to Java, Teradata SQL to Snowflake
- Many companies need help to migrate from an on-premises database to a cloud one





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## Examples of legacy code

It is not just SQL for data applications. There are companies migrating SAS to a combination of Python and SQL to handle both data analysis and storage.





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## Examples of legacy code

- A company develops software for managing infrastructure (i.e., climatization systems for buildings, industrial technology, etc.). Over the years they developed a variety of systems to serve different clients' needs or pieces
- They needed to support a new technology, they developed a new software





## Examples of legacy code

- The cost of maintaining old software kept going up and even their own teams had difficulty understanding their codebase
- They decided to change their overall approach. They put their domain knowledge in a DSL that could power all their software for decades to come





## Examples of legacy code

- They expressed their business advantage, their expertise, in code written in DSL
- They re-build their client apps on top of this DSL
- If you are not sure what is a DSL, do not worry, we are going to talk about it in a following lesson





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## Examples of legacy code

Software does not rot. However, changes in business practices and environment can create legacy code.

There are changes in vendors, changes in available people, alternative solutions that perform better, and changes in the way we work.





## Examples of legacy code

For example, the migration from desktop to web or mobile apps. In some sectors, desktop apps are becoming like mainframe code.







## Examples of legacy code

We worked with a company with apps in Visual Basic.

When Microsoft stopped developing Visual Basic they could not improve their apps. But it was still not convenient to recreate the same app in another language, so they got stuck with legacy code.





## Examples of legacy code

They decided to move from a desktop app in Visual Basic to a web one in JavaScript.





## Summary

In this lesson we have seen that legacy code is not just *old code*.

It is old code that still matters and impacts your business.

