

Low-Code/No-Code Development

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What is Low-Code/No-Code (LCD/NCD) Development?

Low-Code: Creating software with small amount of code by reducing the amount of traditional hand coding.

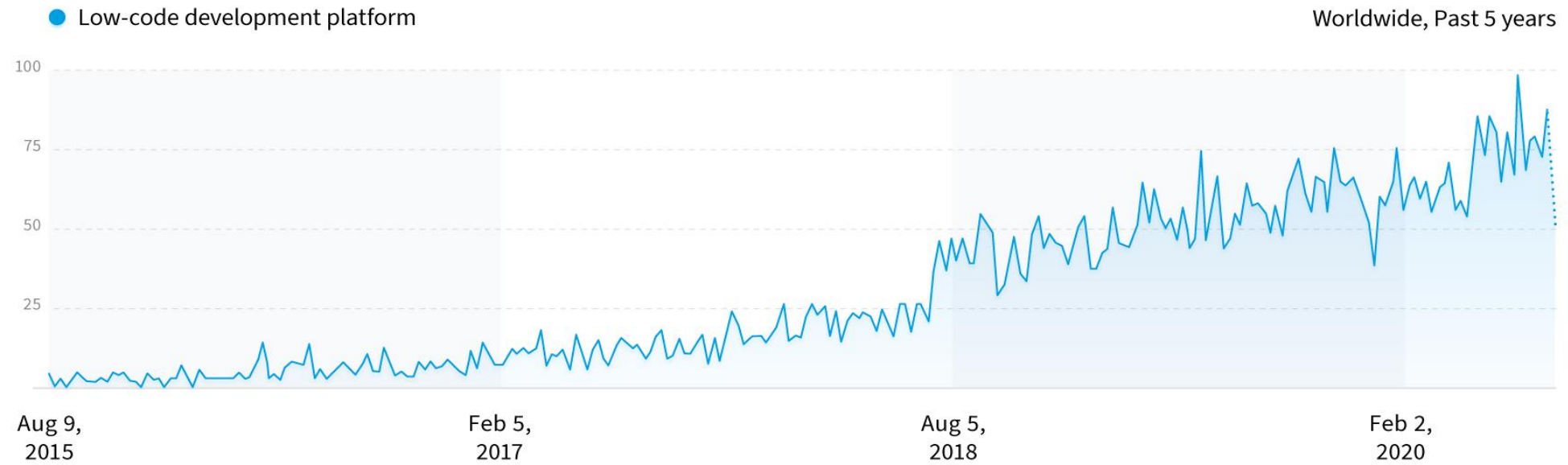
No-Code: Create software using graphical user interfaces and configuration instead of traditional computer programming. Closely related to Low-Code development platforms.

Other definitions: Visual Programming, Drag-and-drop. Graphical User Interface, What you see is what you get.

Why Low-Code/No-Code Development is Getting Popular?

- ❑ Research company Gartner says that by 2021, the demand for information systems will increase five times faster than the ability to provide them by IT departments.
- ❑ Number of employees are not growing at a sufficient pace.
- ❑ Recruiting software engineers has become increasingly difficult as demand is high and supply is low.
- ❑ More than 50 percent of medium to large enterprises will have adopted to these application platforms by 2023
- ❑ People with no programming knowledge can easily adopt to these platforms to build applications.
- ❑ First Low-code integrated development environment (IDE): Visual Basic .NET

Trends



Traditional Development vs NCD/LCD

CHARACTERISTIC	TRADITIONAL DEVELOPMENT	NO-CODE/LOW-CODE DEVELOPMENT
Development resources	Developers with expertise in programming languages for: <ul style="list-style-type: none">•web app development•mobile app development	An intuitive drag-and-drop interface for web/mobile app development by: <ul style="list-style-type: none">•citizen developers•professional developers
Development time	Lasts for months and includes: <ul style="list-style-type: none">•extensive coding•multiple prototype revisions•testing and bug fixes	Is accelerated by 10x thanks to: <ul style="list-style-type: none">•no need for coding•ready-made design templates•drag-and-drop interface
Development cost	Depends on the developer's hourly rate:	Depend on the subscription plan and the number of users:

CHARACTERISTIC	TRADITIONAL DEVELOPMENT	NO-CODE/LOW-CODE DEVELOPMENT
Multiplatform	The app should be developed separately for each platform	The app can work: <ul style="list-style-type: none"> •for mobile •for web •in the cloud
Maintenance	<ul style="list-style-type: none"> •requires additional development •is extensive to support 	<ul style="list-style-type: none"> •easy to update and extend •great for prototyping
Deployment	<ul style="list-style-type: none"> •requires many steps •requires much development resources •slow and complex 	<ul style="list-style-type: none"> •one-touch deployment to multiple environments

When to Use LCD/NCD and Traditional Development

Use LCD/NCD:

1. For Business Use Cases that Drive Agile Transformation
2. Quick Application Development by Business Users
3. For Unique and Customizable Solutions

Use Software Development:

1. For Open-Ended Solutions
2. For Applications Requiring High Level of Specialized Interactivity

What platforms are used?

Bubble.io

Airtable

Wix (Editor X)

WordPress

Outsystems

Microsoft Power Apps

Google App Maker

Salesforce App Cloud

Shopify

Zapier

Glide

Supporting Technologies Behind LCD/NCD contd.

1. React Native Development platform: Develop Android and iOS apps.

OREOPS is a low code platform to develop react-native mobile applications.

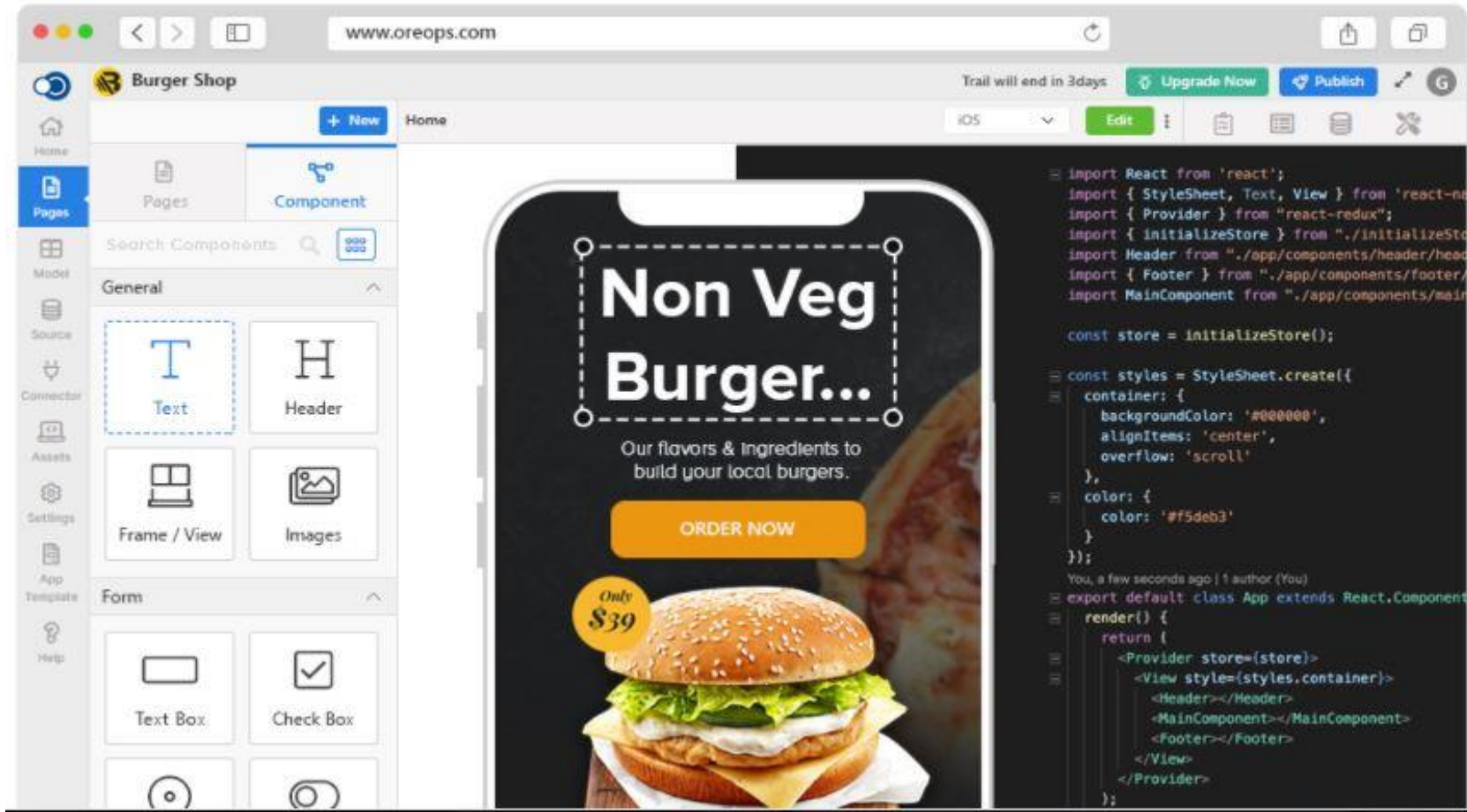
Mobile Components: Configure models for text, images, videos, lists, buttons, etc.

API Integration: Integrate your app with legacy systems or third-party applications for easy data access.

App Pages: Create app pages in a click and simply drag and drop components

Files and Media: Ensures a simple upload of docs including Js files for effective use.

SmartCode: Let you design your app with limited or no coding knowledge.



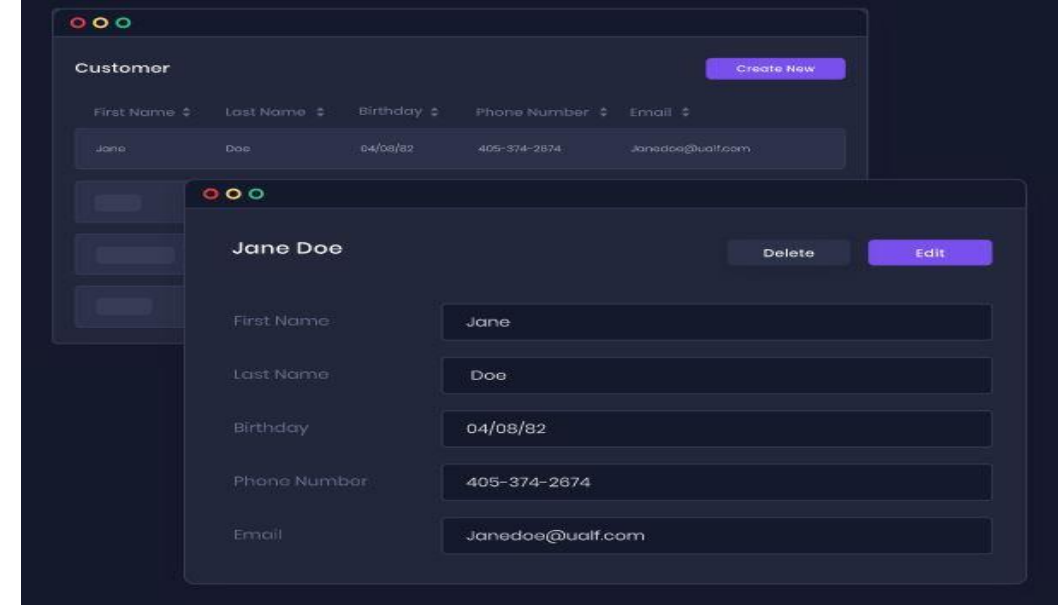
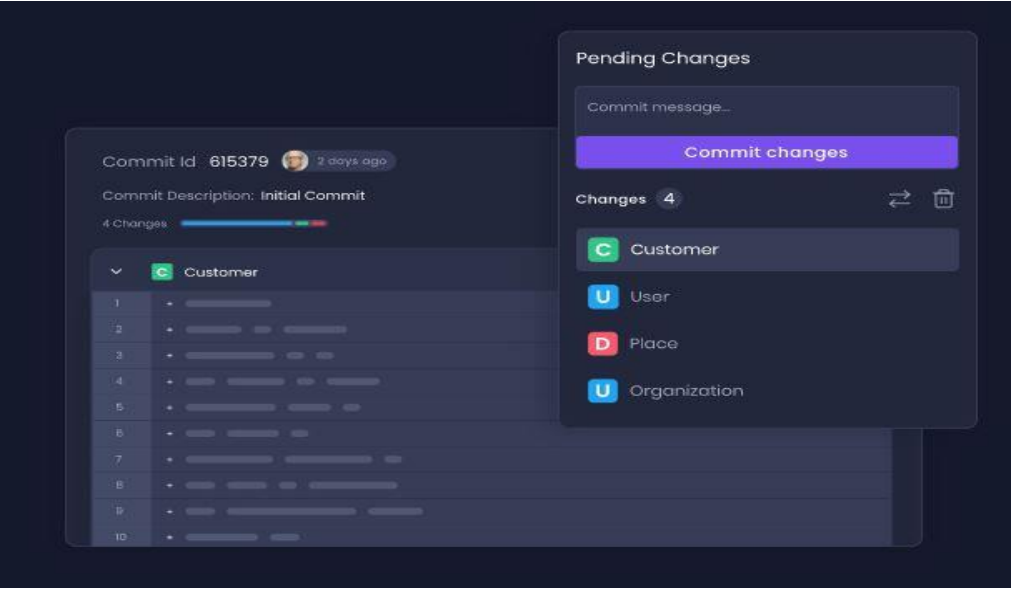
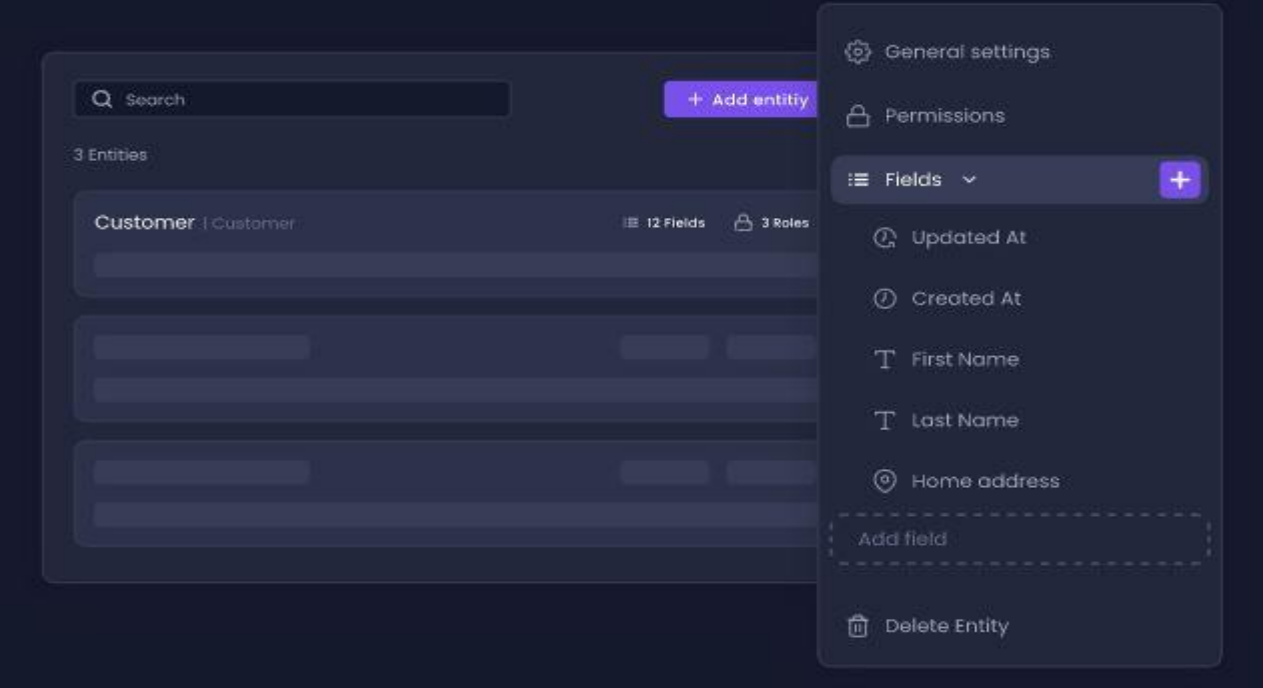
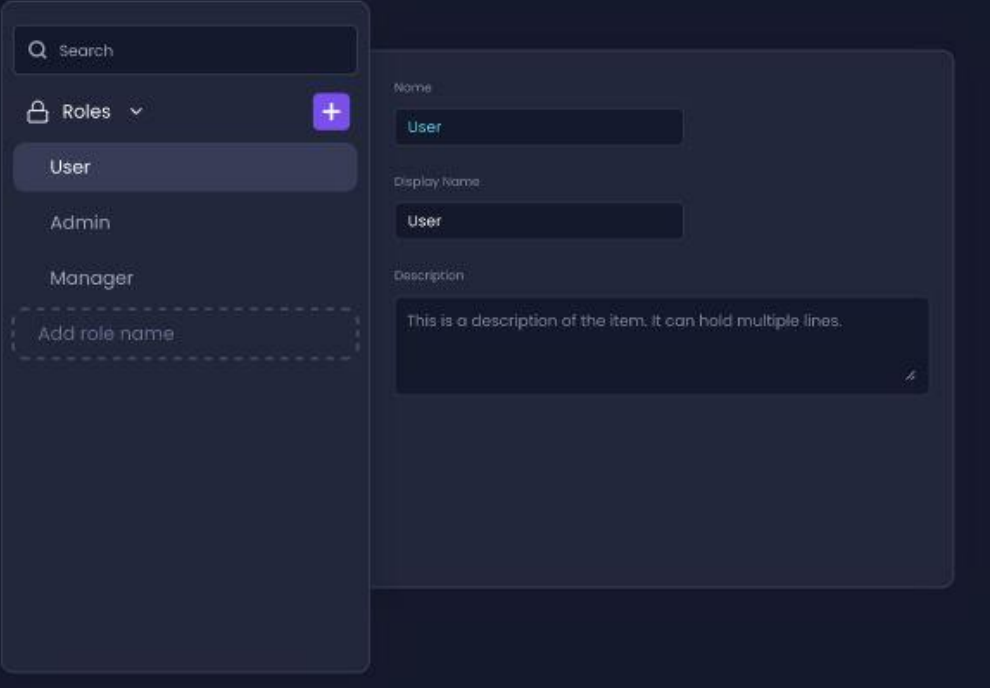
Supporting Technologies Behind LCD/NCD contd.

2. Node.js

- ❑ Node-RED is a low-code programming for event-driven applications built on Node.js
- ❑ Amplication is an open source development tool that helps to develop quality Node.js applications.

Amplication works:

1. Design model and roles : Define data entities and role-based access through Amplication's UI or CLI, and it will auto-generate you database, an Admin UI, and API
2. Deploy you appl in one click
3. Sync your app with GitHub
4. Access your app: Auto-generated admin UI based on the data model schema enables to access data with ease.
5. Connect your code using REST or GraphQL.



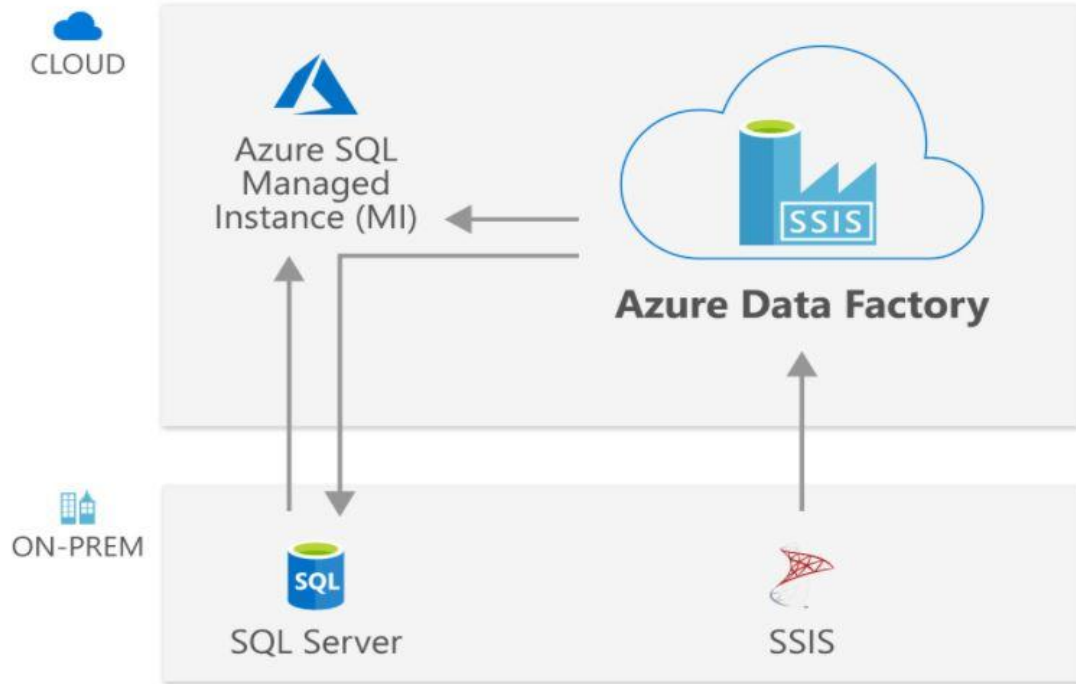
Supporting Technologies Behind LCD/NCD contd.

Apache Spark : Unified analytics engine for large-scale data processing

Azure Data Factory: A fully managed, serverless data integration service. Accelerate data transformation with code-free data flows. Managed Apache Spark service take care of code generation and maintenance.

Easy-to-use: Rehost SQL Server Integration Services (SSIS) in a few clicks and build ELT and ELT pipelines code-free, with built-in-Git and CI/CD support.

Cost-effective: Enjoy a pay-as-you-go, fully managed serverless cloud service that scale on demand
Powerful: Ingest all your premises, and software as a service (SaaS) data with more than 90 built-in connectors.



Supporting Technologies Behind LCD/NCD contd.

Server-side scripting : In web development that involves employing scripts on a web server and produces a response customized for each user's request. Allow user to create website with zero code.

WordPress:

Plugins: Infinite combinations, infinite possibility.

Ecommerce: Turn your site into a store

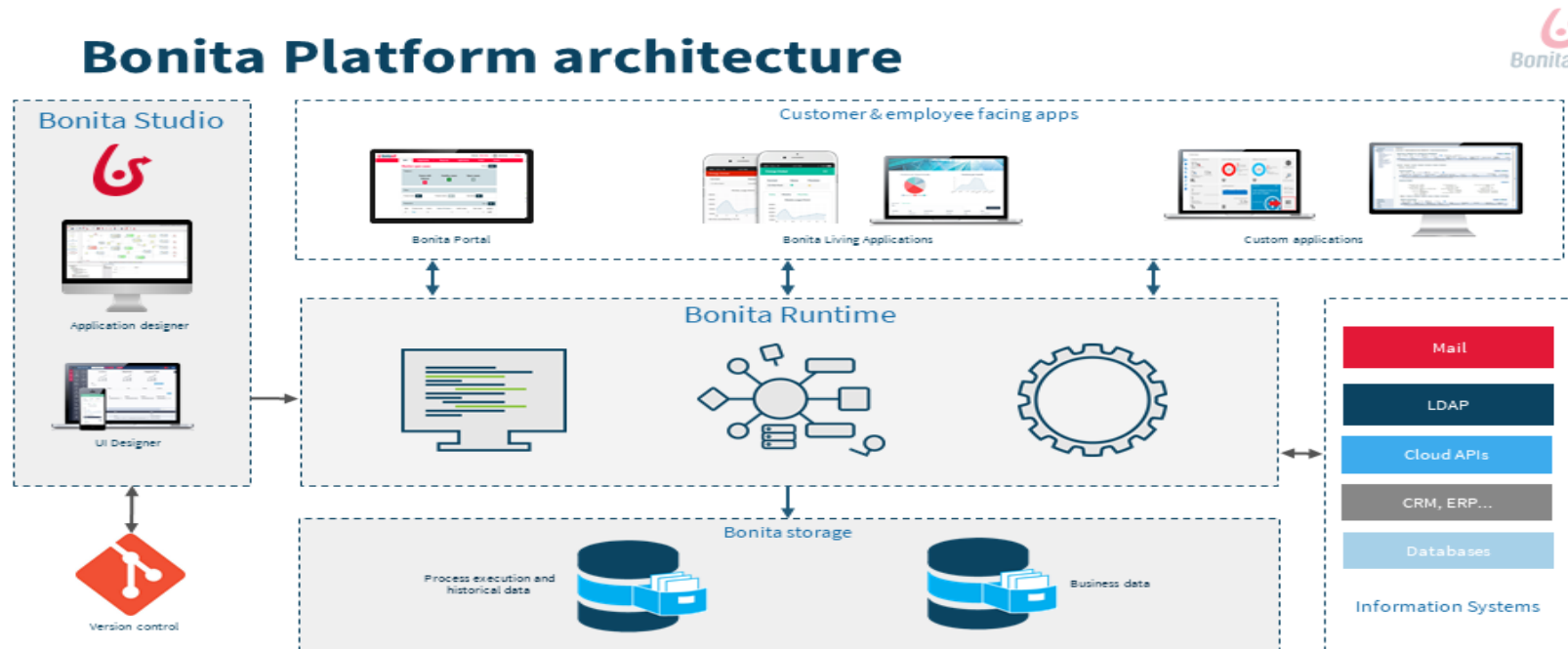
Built-in marketing: Rely on built-in SEO tools, Mailchimp, Google Analytics integrations.



Supporting Technologies Behind LCD/NCD contd.

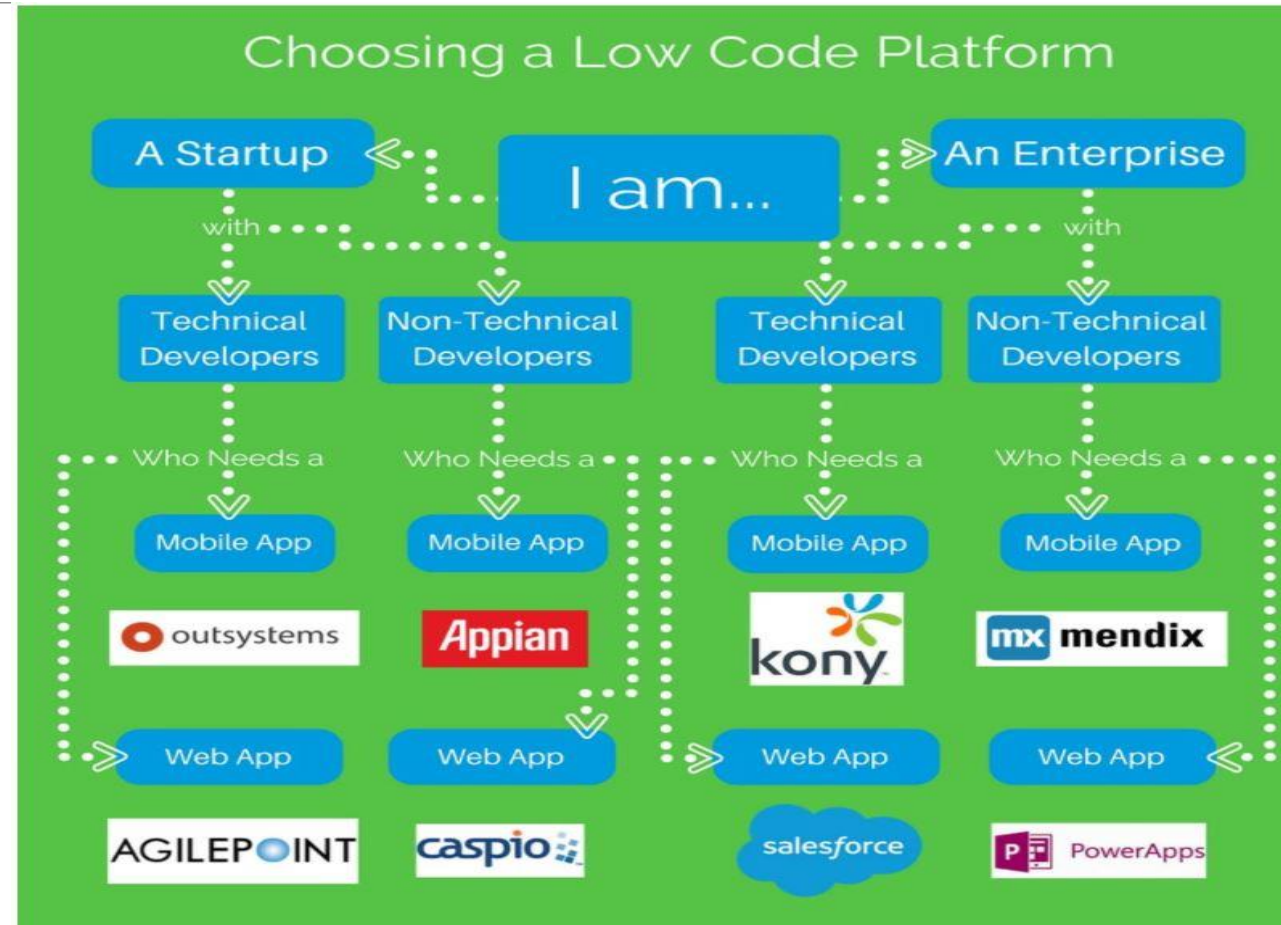
SOAP (Simple Object Access Protocol) : Messaging protocol specification for exchanging structured information in implementation of web services.

Bonita: Open Source digital process automation platform. Use model-driven Bonita Studio with drag-and-drop visual process design to define fundamental business logic.
Use connectors and REST APIs to integrate with you enterprise technology stack.



Types of Applications developed.

Mobile Applications
Web Applications



Kinds of Supported Applications:

Event Monitoring

Process Automation

Approval Process Control

Escalation Management

Inventory Management

Quality Management

Workflow Management

Benefits

Faster development

Ease of study and use

Lower IT cost

Rich and ready-to-use units

Newbie friendly

Improved system quality

Strong integration and expansion capability

Minimal efforts

Better user experience

Improved IT governance

Limitations and Challenges

High learning curve

High pricing

Lack of customization

Slow loading and publishing

Less powerful than programming

Complex issues still need coding

No access to source code

Limitations for experience developers

Vendor lock-in

Difficulty of maintenance and debugging

Need of basic programming knowledge

Capabilities that a LCD/NCD platform can Offer and their features[2]

- Graphical User Interface: Represents provided functionalities available in frontend.
Features: Drag-and-drop tools, forms, point and click approach, pre-built dashboards, built-in workflows
- Interoperability support with external services and data sources:
possibility of interacting with external services. (Dropbox, Zapier, Office 365)
Features: Interoperability with external services, connection with data sources
- Security Support: Security aspects like authentication mechanisms, adopted security protocols.
Features: Application, Platform security
- Collaborative Development Support: Collaboration models.
Features: on-line, off-line collaborations
- Reusability Support: Enable to reuse already developed artifacts.
Features: Built-in workflows, Pre-built forms/ reports, pre-built dashboards.

Capabilities and Features Contd.

- Scalability Support: Scale up applications according to different dimensions.
Features: Scalability on number of users, data traffic, data storage.
- Business Logic Specification Mechanisms:
Specify the business logic of the application modeled.
Features: Business rule engine, graphical workflow editor, AI enabled business logic, API support
- Application Build Mechanisms: Ways the application is built.
Features: Code-generation, models at run-time.
- Deployment Support: Deploying the modeled application.
Features: Deployment on cloud, local infrastructures.

References

1. <https://arxiv.org/pdf/2107.07482.pdf>
2. https://www.researchgate.net/publication/344842798_Supporting_the_understanding_and_comparison_of_low-code_development_platforms
3. <https://www.youtube.com/watch?v=jaRCENYBuYo>
4. <https://www.youtube.com/watch?v=JwM9NrePPMc>
5. <https://steelkiwi.com/blog/traditional-coding-vs-no-codelow-code-development/>
6. <https://www.zoho.com/creator/decode/low-code-vs-traditional-development/>
7. <https://stackify.com/low-code-dev-platform/>

Acknowledgement

Dr. Wei Yang