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lightcode

Strengthening the Digital
Transformation of Higher Education
Through Low-Code

10. Data Management

KarmicSoft

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OVERVIEW

Introduction

In our increasingly digital world, data is everywhere. Whether you're managing a list of favorite books, organizing a student project, or building a business tool, working with structured information is a fundamental skill. But managing data doesn't have to be complicated or hidden behind complex tools and technical jargon. With LightCode, database management becomes something visual, intuitive, and—dare we say—fun!

This module is not about learning abstract database theories or memorizing technical definitions. Instead, it's about giving you the **practical ability to interact with data directly**—to see it, change it, and immediately understand its impact through visual representations. You'll start by exploring a simple but powerful component: the **data grid**. This grid lets you organize and edit data just like you would in a spreadsheet but embedded directly within your application. You'll see how clicking a column title sorts your data, how editing a value updates your app in real time, and how small data changes can ripple through to visual elements like charts.

Building on this hands-on experience, you'll take the next step and create a visual connection between your data grid and a **chart**. Want to see the fastest dog in our tutorial dataset? Just sort the grid and watch the chart update! Curious how changing a value affects the visual output? You'll be able to see it happen instantly. This approach brings data management to life, making it interactive and immediately useful.

And while we're starting with in-memory data—keeping things simple and easy to reset—this skill forms the foundation for more advanced scenarios. Soon, you'll learn how to connect your apps to external data sources, allowing you

to manage and visualize live data shared across teams or even entire organizations.

By the end of this module, you'll not only understand how to manage data visually, but also how to **create value for your users** by making their data interactive, meaningful, and easy to navigate—turning raw information into actionable insights.

Why Is This Module Important?

Applications today are more than static displays; they respond, calculate, and visualize data in real time. Being able to:

- Organize and modify data visually,
- Instantly visualize the impact of those changes, and
- Deliver clear, meaningful insights through interactive charts

…is a game-changing skill for any career.

In this module, you'll start by learning exactly that—without diving into the complexities of SQL or database administration. And because we work directly with familiar examples (like our playful dog dataset), you'll see how this skill can apply to almost any scenario: from managing events to visualizing personal projects.

Learning Outcomes

By the end of this module, you will:

- Understand the basic concept of a **data grid** and how to manipulate data directly.
- Create a simple bar chart and connect it to your data grid.
- Visualize how data updates reflect immediately on your chart.
- Learn the basics of working with **in-memory data** and understand how this skill extends to online sources like Google Sheets (covered later in this course).
- Build foundational knowledge of data models in LightCode using YAML and visual design.
- … and more.

Prerequisites

- Completion of Chapter 8 (Let's Explore the LightCode Platform).
- Basic comfort navigating LightCode and working with blocks.
- No programming knowledge required—but curiosity encouraged!

STRUCTURE OF THE MODULE

Introduction: Data is Everywhere

Discover why working with data is a critical skill in today's digital world—and why it doesn't have to be complex. Get ready to experience hands-on data management in the simplest and most visual way.

Explore the Data Grid

Dive straight into the action by exploring a fully interactive data grid. Edit values, sort records, and watch how easy it is to shape your data directly—no technical barriers, just instant results.

Customize the Grid – Make It Your Own

A few simple changes can transform how your data feels and looks. Learn how to personalize titles, icons, and helpful instructions to create a more professional and engaging experience.

Add a Chart – Watch Data Come Alive

Bring your data to life with a single action. Add a chart, connect it to your grid, and experience the magic of real-time visual feedback. No code, just clear and immediate insight.

Reflect – What Did You Discover?

Pause and look back at what you've created. This isn't just about handling data—it's about making it meaningful. Take a moment to see the bigger picture.

Look Under the Hood – YAML in Action

Curious about how everything is structured behind the scenes? Peek into the YAML files that define your project and discover how simple, readable code makes all this possible.

Connect to Google Sheets – Real-World Data at Your Fingertips

Ready to add more power to your skills? Learn how to bring live data from Google Sheets directly into your app. It's a small step with big potential.

Knowledge Check – Earn Your Badge!

Test what you've learned with a quick and fun quiz. Complete it and unlock your **Data Wrangler** badge—proof that you can turn data into action!

Conclusion: You're Not Just Managing Data, You're Telling Its Story

Wrap up your learning journey and see how these new skills fit into real-world situations. And of course, get excited for what's next.

DATA MANAGEMENT, STEP BY STEP

Imagine you're helping to organize the annual **Neighborhood Dog Festival** 🐕. Dozens of playful pups are registered for agility contests, cuteness competitions, and even a fastest tail-wagging challenge. But as the event approaches, the volunteer team is overwhelmed trying to manage all the dog profiles, event entries, and speed contest results across messy spreadsheets and paper forms.

Instead of chaos, you open LightCode. With just a few clicks, you set up a **data grid** to track each dog's name, speed score, and cuteness rating. Better yet, you add a simple **bar chart** connected to the grid, allowing everyone to instantly visualize which dogs are leading the speed challenge.

Little Rocket, the speedy terrier, just clocked a new personal best? Update his speed in the grid, and the chart updates immediately for all to see. No complicated formulas, no waiting for someone else to "handle the data"—you're in control, and it's all happening live.

This isn't just about managing dog data. It's about realizing that with the right tools, you can turn everyday information into interactive, insightful experiences—adding real value for everyone involved. And just like that, you've unlocked a skill that can help you in countless future projects.

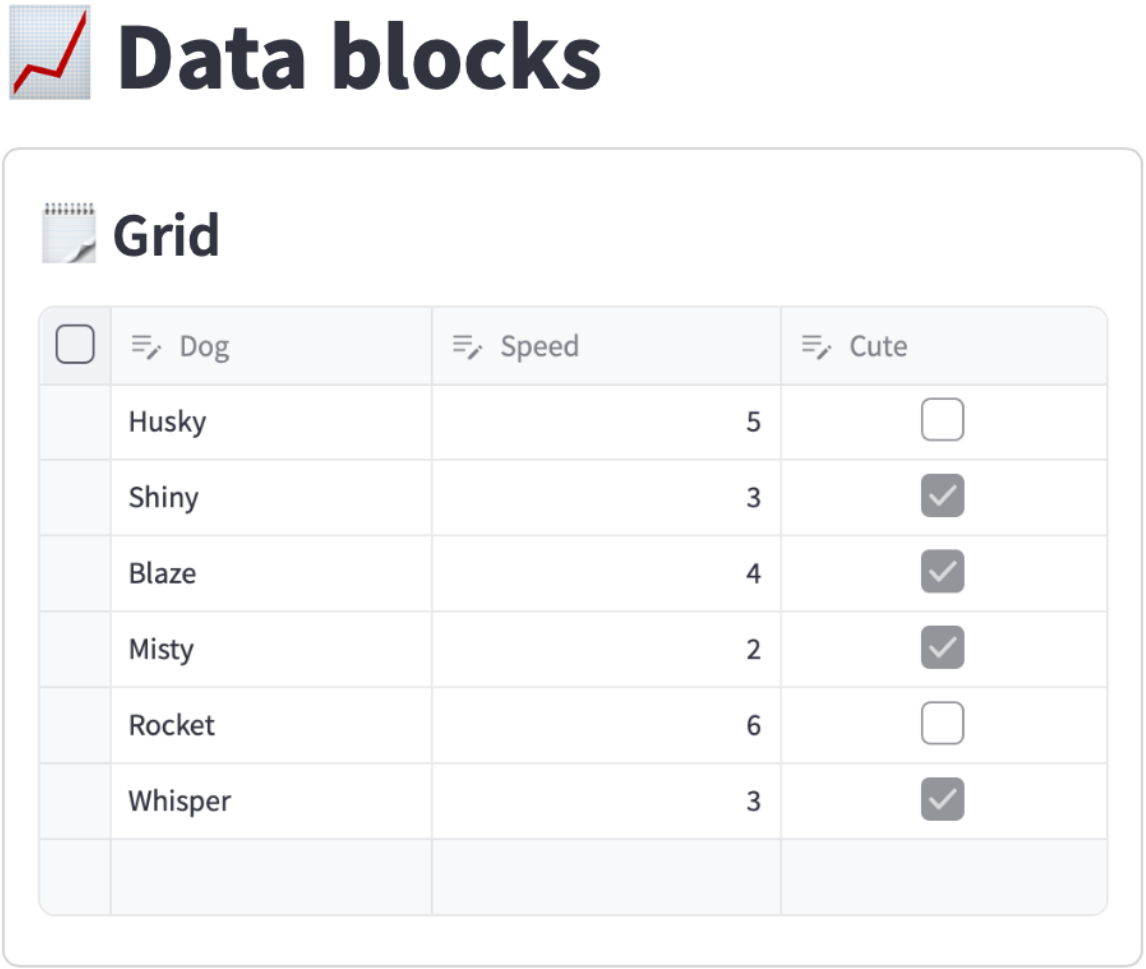
Ready to give it a try? Let's jump into the LightCode platform and see how managing data can be as easy—and as fun—as playing fetch with your favorite dog! 🐾

Understood! Here's a smooth transition inviting the learner to open the module, explore the data grid, and interact directly—explaining the user actions clearly, without referencing Streamlit or any underlying technology.

1. Let's Explore the Data Grid

Now it's your turn to take control! Open the **Database** module on the LightCode platform. You'll be greeted by a clean, interactive data grid displaying details about our familiar four-legged friends. 🐶

This isn't just a static table—it's fully interactive. Think of it like a smart notebook where every cell can be changed, sorted, and organized to match exactly what you want to see.



Here's how you can start experimenting:

- **Sort the Data:**

Click on any column header—like **Dog** or **Speed**—to instantly sort the list. Want to see who the fastest dogs are? Just click on the **Speed** column, and the grid will reorder itself. Clicking again will toggle between ascending and descending order.

- **Edit Values:**

Try clicking directly into a cell. Change a dog's speed, or toggle whether they're marked as **Cute**. As soon as you make a change, it's applied instantly—no need to save or confirm. Want Rocket to slow down a bit? Just change his speed from 6 to 4 and see what happens!

- **Add New Records:**

Scroll down to the bottom of the grid to add a new row. Give your new canine friend a name, set their speed, and decide if they earn a "cute" badge. Your data grid updates live as you type.

- **Delete Records:**

Need to clean up the list? Select a row and remove it with a single action. This keeps your data tidy and focused.

- **Explore Interactions:**

Play with the data and observe how changes impact the information displayed. In the next section, you'll connect this grid to a chart and see your changes reflected visually—bringing the data to life right before your eyes!

💡 *Remember: You're not just clicking around—you're learning how real applications handle and display data dynamically. And it's this exact skill that makes apps interactive and engaging!*

2. Customize the Grid – Make It Your Own

You've already explored how to view and edit data directly in the grid. Now, let's take it one step further by personalizing the grid to fit your needs. Just like you learned in **Module 4**, small customizations can make your app more user-friendly and visually engaging.

✨ Change the Title and Icon

- Open the configuration panel for the grid block.
- Look for the **Title** field. Try changing it to something fun or relevant—perhaps *"Dog Speed Contest 🏁"* or *"Cuteness Evaluation Center 🐾"*.
- Notice the **Icon** field? Select an emoji that reflects your data theme. Maybe swap the default icon for something playful like 🏆 or 🐕.

As soon as you make these changes, the grid will reflect your new title and icon immediately, creating a more polished and purposeful experience for users.

🎨 Add a Description or Instructional Text

- Find the **Text** or **Description** field and add a short note for users.

Example: *"Edit the dogs' speed scores to see who wins the race! Don't forget to mark your favorites as cute!"*

This little touch helps guide users and makes your app feel more professional and user-focused.

💡 *Tip 1: Clear titles and instructions aren't just about looks—they help users understand how to interact with your app confidently and effectively. This is exactly how Citizen Developers create impactful user experiences without writing code!*

💡 *Tip 2: When customizing the grid, and any block actually, notice that the configuration fields in the inspector often provide helpful **hints**. These hints explain what each property does and suggest how to use it effectively. Take a moment to hover over or click on them—this built-in guidance will help you learn and apply new options without needing to search for external documentation!*

Thank you for the clarification! That's even better—it reinforces the immediate feedback loop that makes this learning experience powerful. Here's the corrected version:

3. Add a Chart – Instantly Visualize Your Data

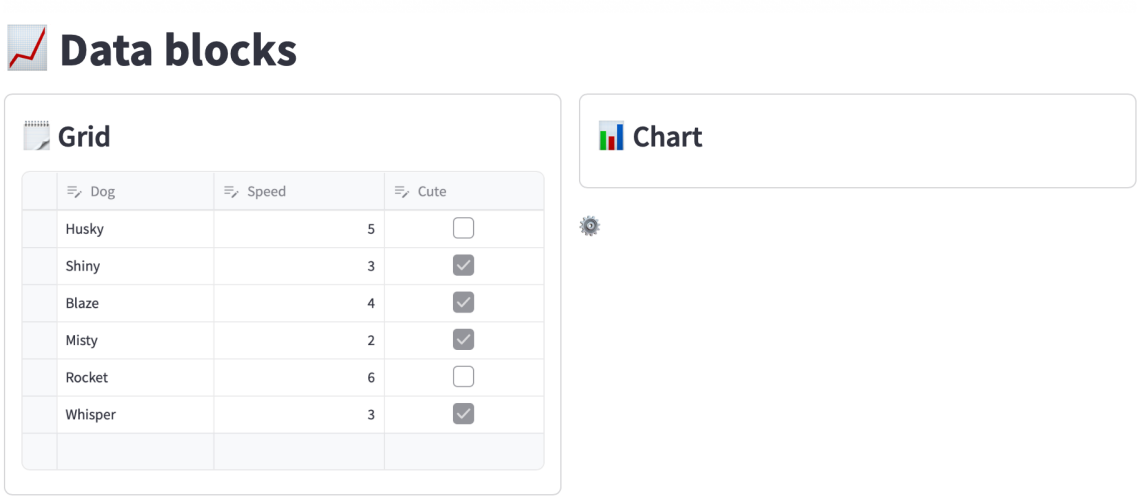
Now that your data grid is in place, let's introduce a chart to instantly bring that data to life. In LightCode, you don't need to go through complicated steps—just link the chart to your grid, and it will immediately start reflecting the data through visual bars. Simple changes in the grid will update the chart in real time, without any extra configuration.

📊 Add the Chart Block

1. In the LightCode editor, click to **add a new block**.

2. Select the **Chart** block from the available components.

3. The chart block will appear but is empty.

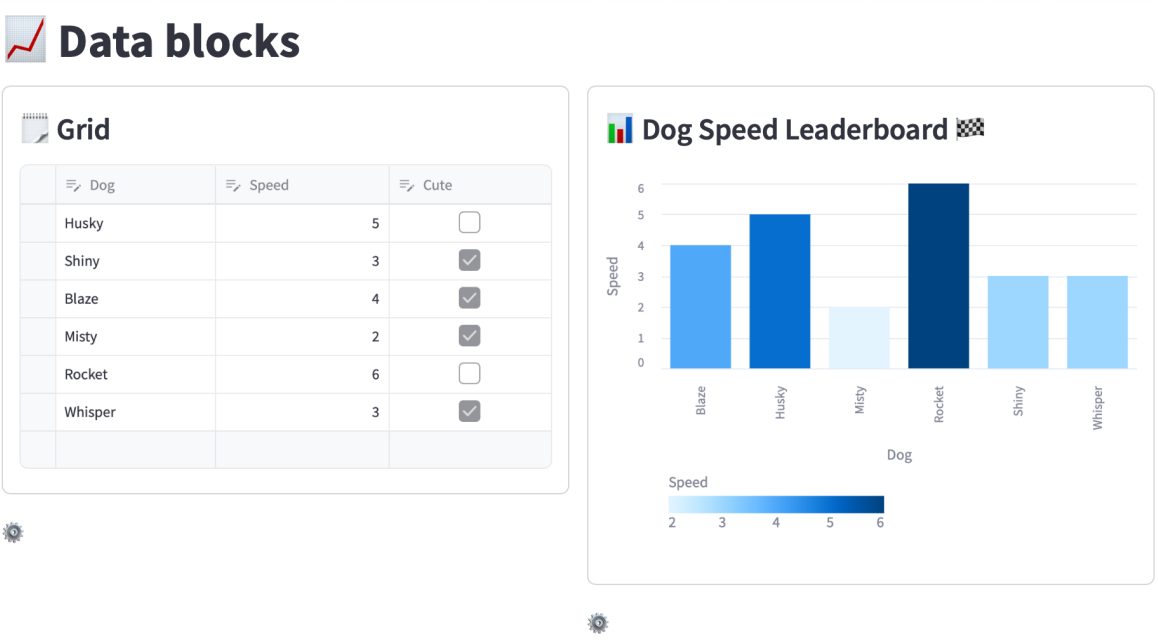


🛠️ Configure the Chart Basics

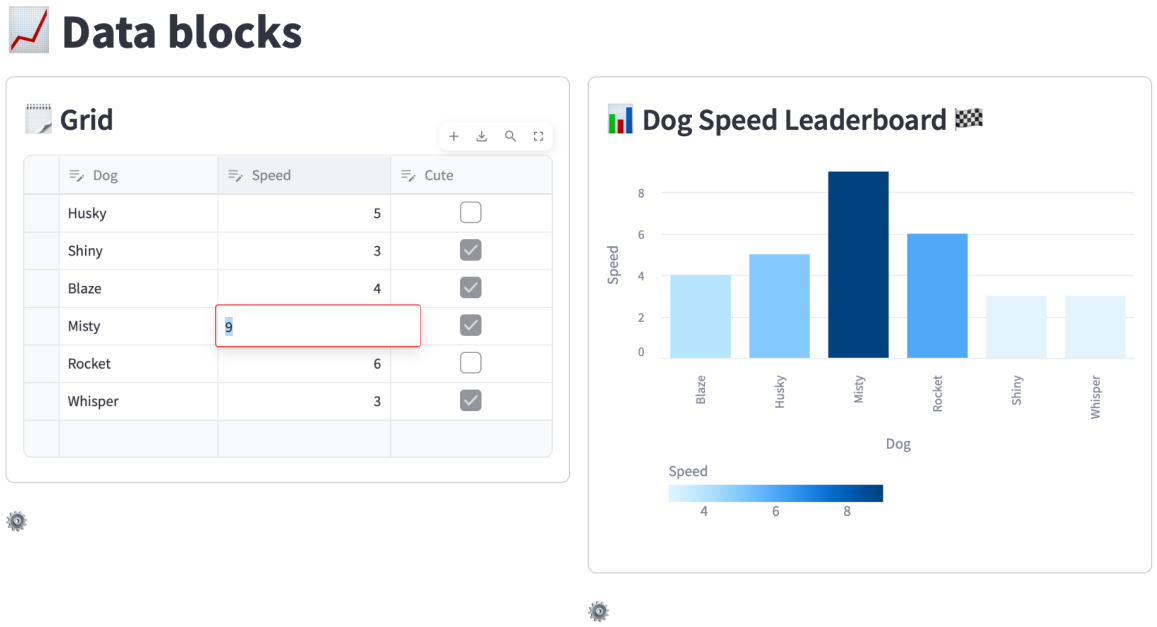
1. Open the **Inspector Panel** for the chart.

2. In the **Title** field, give it a meaningful name, like *"Dog Speed Leaderboard 🏁"* or *"Who's the Fastest? 📊"*.

3. Now, link the chart to your grid by selecting it in the **Grid Source** field.



That's it! The chart immediately reads the data and displays it visually. Change a dog's speed in the grid—watch the chart update automatically. Add a new dog or modify existing values, and see the changes reflected instantly.



💡 *Tip: This live feedback isn't just fun—it's powerful. It helps users immediately understand the impact of their changes, turning data management into a clear, visual, and engaging experience.*

4. Take a Moment to Reflect – What Just Happened?

In just a few simple steps, you've experienced something incredibly powerful:

- You organized and modified live data directly through a visual grid.
- You added a chart that instantly brought that data to life—without writing a single line of code.
- Every change you made was immediately visible, making it easy to explore "what-if" scenarios and understand how small changes affect the bigger picture.

This is the essence of modern data-driven applications. Simple, fast, interactive. And now, you have taken your first steps toward creating them!

📚 *Ask yourself:*

- What did you notice when you changed values in the grid?
- How did the visual feedback help you better understand the data?
- How could this skill be useful beyond the dog contest—maybe in a project, a class assignment, or even managing a personal event?

🎯 *Challenge for Curious Minds:*

Try adding one more record to the grid—maybe invent a new dog contender! How does that change the visual balance in the chart?

5. Looking Under the Hood – How LightCode Describes This in YAML

You've just experienced how easy it is to build interactive apps visually. But did you know that everything you created is also represented behind the scenes using a structured language called **YAML**?

YAML is a human-friendly way to describe the structure and behavior of your app. You discovered it earlier in Module 8, and now it's time to see it in action with your current project.

📄 Here's the YAML Representation of What You Built:

```
instances:
  - !Scene
    icon: 📈
    as_name: scene
    title: Data blocks
    lines: [2, 2]

  - &id001 !Grid
    icon: 🗒️
    title: Grid
    text: This is a grid component.
```

- &id002 !Chart

  icon: 📊

  title: Dog Speed Leaderboard 🏁

  columns:

  - Dog

  - Speed

  - Cute

  grid: *id001

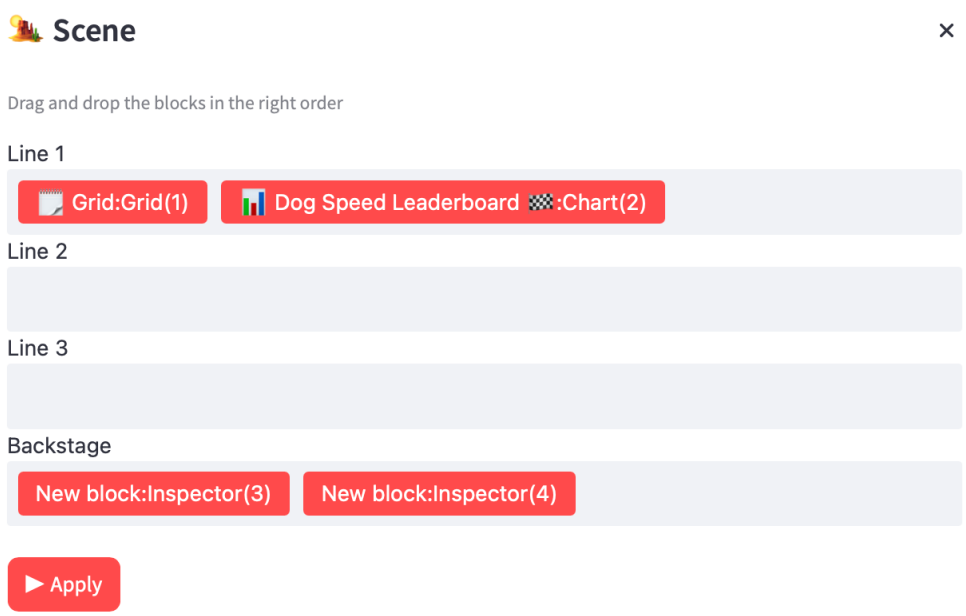
📝 **Let's Break This Down Together:**

- **instances:**

This section lists all the blocks (or components) that appear in your app, either visual or not. Each one is an instance of something—like a scene, a grid, or a chart.

- **- !Scene**
  - This defines the main workspace or screen where your components are placed.
  - icon: 📈 → Adds a little visual icon to identify this scene easily.

- as_name: scene → Gives this scene a reference name for internal use. This makes the block accessible to python code.
- title: Data blocks → This is the title displayed at the top of the scene.
- lines: [2, 2] → Arranges blocks visually in 2 rows and 2 columns. This explains why the grid and the chart are side by side. Remember you can use the Layout feature and rearrange the scene, or even store some of them in the backstage, by simply using drag and drop.



By the way, did you noticed two curious inspectors hidden backstage? Could you try to make them visible?

- **- &id001 !Grid**
  - This creates the **data grid** component. The *&001* is the reference the chart can use to relate to the grid. But you don't need to worry.

The interactive configuration will create necessary references when connecting the blocks.

- icon: 🗒️ → A notepad emoji represents the grid visually.
- title: Grid → The label shown to users.
- text: This is a grid component. → A simple description to guide users.

- **- &id002 !Chart**
  - This adds the **chart** component you placed on the scene.
  - icon: 📊 → The bar chart emoji gives users a quick visual clue.
  - title: Dog Speed Leaderboard 🏁 → The title displayed above the chart.
  - columns: [Dog, Speed, Cute] → Specifies which data columns from the grid should appear in the chart.
  - grid: *id001 → This links the chart to the grid using a YAML reference.
    - *id001 points directly to the grid you defined earlier, so the chart always stays connected to its data source.

💡 *Notice how clean and readable this is? YAML doesn't hide information behind complicated code—it makes the app's structure easy to understand, modify, and share.*

📦 Where Is This Module Stored? A Quick Reminder

As you discovered in **Module 9: Collaborate with Your Team**, all the modules and apps you create with LightCode are saved as **YAML files** and stored directly in your own **GitHub repository**.

This isn't just a technical detail—it's an important reminder that **you fully own your work**. Everything you create—whether it's a playful dog leaderboard or a more serious project—is safely stored, versioned, and accessible anytime.

- You're free to review and edit your YAML files directly.
- You can share your work easily with classmates or collaborators.
- And because your work lives on GitHub, you're naturally building valuable digital skills that apply well beyond LightCode.

💡 *Remember: Owning your data means you're never locked into a single tool or platform. Your projects, your rules!*

📚 *Take a moment now to explore where your work lives. Can you find the link to your GitHub repository? If everything is properly configured, you'll see it right in the module interface. Click it, browse your YAML files, and see how your project looks "under the hood."*

💡 *This is not just storage—it's your personal archive of achievements!*

Thanks for the clarification, Michel! Here's a well-balanced, practical section introducing data reading from Google Sheets. It positions the skill as

immediately useful without crossing into territory reserved for certified data professionals.

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6. Read Live Data from Google Sheets – Add Real-World Value 🌍

In many organizations—both public and private—important data is often shared and updated using simple tools like Google Sheets. While database management remains the responsibility of certified experts, being able to **read and display live data from Google Sheets** is a highly valuable and operational skill.

And the good news? With LightCode, you can achieve this without worrying about complex configurations or security permissions reserved for professional DBAs. Or, almost 😉

📖 Example – Connect a Google Sheet to Your Grid

Let's say you're managing a shared Google Sheet called *DogFestival2025*, containing updated participant information:

Dog Name	Speed	Cute
Husky	5	❌
Blaze	4	✅
Rocket	6	❌

To connect this Google Sheet:

1. **Prepare the Sheet**

- Ensure your sheet is published to the web or shared with appropriate permissions (view access is enough).
- Copy the **CSV export link** or **public URL**.

2. **In LightCode:**
   - Open your grid's **Inspector Panel**.
   - In the **Source** field, paste the Google Sheets link.

LightCode will read the data directly and populate your grid. Any updates made to the Google Sheet (by you or collaborators) will be reflected in the grid the next time it's loaded—no extra work required!

💡 *Tip: This is an excellent way to build live dashboards or reporting tools that rely on shared data without the risks and responsibilities of managing sensitive databases. You provide value while respecting data governance policies.*

📚 *Remember: You'll learn more about saving and validating this kind of data in **Module 12: Data Validation and Consistency**. For now, focus on using shared data responsibly and understanding how to display it effectively.*

Here's a short and focused quiz to reinforce the key operational skills covered in this module, without turning it into a technical exam.

7. Knowledge Check – Are You Ready to Manage Data Visually?

Which of the following actions can you perform directly in the LightCode data grid? *(Select all that apply)*

- Write custom SQL queries.
- Edit data values directly in the grid.
- Sort records by clicking on column titles.
- Add new rows directly in the grid.
- Configure database indexes.

When you add a chart and link it to a grid, what happens immediately?

- You need to write code to see the data visualized.
- The chart automatically reads and displays the data from the grid.
- You have to manually refresh the chart every time data changes.
- Charts only work after saving the project to GitHub.

What does linking a Google Sheet to your grid allow you to do?

- Modify the Google Sheet directly from LightCode.
- Read and display shared data in your application.
- Manage user permissions on the Google Sheet.
- Save changes from the grid back to the Google Sheet automatically.

Why is it important to understand where your module's files are stored?

- To request permission from an admin to view them.
- Because you fully own your work and can edit or share it anytime.
- So you can delete the files when the project is finished.
- Because only LightCode administrators have access to them.

True or False: LightCode's goal is to replace advanced Computer Science expertise with simple tools.

- True
- False *(Correct! LightCode empowers you with operational skills, while respecting the importance of expert roles for organizational data governance.)*

🎉 *Well done! Whether you nailed it or learned something new, you've built valuable operational skills that make a real difference in collaborative environments. Ready to wrap up this module?*

Data Wrangler – Master of Visual Insights

You now have the operational skills to manage and visualize data effectively, create interactive dashboards, and even connect live data sources like Google Sheets—all without writing complex code.

Keep practicing, and you'll turn everyday information into meaningful insights wherever you go!

CONCLUSION

In this module, you took a significant step forward in your journey as a creator of digital solutions. You didn't just learn about data—you experienced how to manage and visualize it directly:

- You organized and modified live data through interactive grids.
- You brought that data to life with instant visual feedback using charts.
- You explored how to connect your apps to real-world data sources like Google Sheets.
- And importantly, you reinforced that all your work is fully owned and safely stored in your GitHub repository.

These are not abstract skills; they are **operational abilities valued by organizations** across sectors. Whether you're helping a community project, assisting a small business, or supporting a public institution, your new competencies make you a valuable contributor.

And remember:

You’re not expected to replace database experts or manage sensitive organizational data—that’s a task for certified professionals. But by mastering these tools, you bridge the gap between data users and data specialists, creating clarity, insight, and real value where it matters most.

🎯 *In the next modules, you’ll continue developing these skills:

- In Module 11, you’ll explore **Automating Processes** to make your apps smarter and more efficient.
- And in Module 12, you’ll dive into **Data Validation and Consistency**, learning how to ensure data accuracy and reliability.*

🌟 For now, take a moment to celebrate your progress. You’re not just managing data—you’re telling its story!

REFERENCES

To explore data and SQL further (optional), you can experiment with simple queries using the SQL Playground, or follow beginner-friendly tutorials like W3Schools and Khan Academy. These resources help you practice concepts hands-on and strengthen your understanding at your own pace.

🎮 Practice Playground

- ✅ SQLitPlayground (Try SQL Online)

Interactive playground where you can directly practice SQL queries in your browser. No installation required!

📖 Beginner-Friendly Online Tutorials

1. W3Schools SQL Tutorial
    - Easy-to-follow explanations and interactive examples.
    - Topics: Basic SQL queries, filtering data, joins, and more.
2. Khan Academy – Intro to SQL
    - Simple lessons with embedded exercises.
    - Perfect for absolute beginners who enjoy a structured, step-by-step approach.