

# Systems Analysis & Design

## Semester 2025-III

### Workshop No. 2 — Kaggle Systems Design

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Welcome to the second workshop of the *Systems Analysis & Design* course!

In **Workshop #1**, you performed a detailed *systems analysis* of a *Kaggle competition*<sup>1</sup>, identifying the system elements, relationships, sensitivity considerations, and chaos-theory implications. Now, you will build upon those insights to formulate a robust **system design** that aligns with your analytic findings.

#### Workshop Scope and Objectives

- **System Architecture:** Develop a design blueprint that encapsulates the core components (e.g., elements, relations, data ingestion, data processing, model training, model deployment) to address the challenges and requirements identified in Workshop #1.
- **Engineering Principles:** Integrate *systems engineering* principles into your design, ensuring modularity, scalability, and maintainability.
- **Chaos and Sensitivity Measures:** Incorporate strategies to mitigate unpredictable behavior (chaos) and manage sensitive elements discovered during your initial analysis.
- **Documentation & Clarity:** Produce a *System Design Document* that clearly presents your architecture and design decisions, including diagrams and interface definitions.

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<sup>1</sup><https://www.kaggle.com/competitions?listOption=completed&hostSegmentIdFilter=2>.

### Steps to Follow

#### 1. Review Workshop #1 Findings:

- Summarize the main outcomes from your systems analysis, emphasizing critical constraints, data characteristics, and any chaos-theory factors.
- Ensure the proposed design ideas directly address these insights.

#### 2. Define System Requirements:

- Translate analysis findings into measurable design requirements (e.g., performance, reliability).
- Discuss user-centric needs if applicable (e.g., ease of use, interpretability, security).

#### 3. High-Level Architecture:

- Propose an architectural diagram outlining the flow of data and interaction among components.
- Label each module and briefly describe its responsibility (extraction, transformation, modeling, etc.).
- Mention how *systems engineering* principles shaped these structural decisions.

#### 4. Addressing Sensitivity and Chaos:

- Outline how your design addresses high-sensitivity variables or chaotic factors (e.g., feedback loops, random or unexpected data variations).
- If relevant, propose monitoring or error-handling routines for unanticipated conditions.

#### 5. Technical Stack and Implementation Sketch:

- Recommend tools, frameworks, or coding languages (such as Python or R) along with justification.
- Provide a brief plan on how components will be implemented and integrated, referencing any chosen design patterns.

#### 6. Deliverables:

- A **System Design Document** in *PDF format*, placed in a `Workshop_2_Design` folder within your GitHub repository.
- An updated `README.md` explaining the workshop's development process, referencing the architecture diagrams, and linking to the final PDF.

### Deadline

**Saturday, October 18th, 2025, 12:00**

Late work may be subject to grading penalties as outlined in course policy.

### Notes

- The report must be submitted in **English, PDF format**, and should reference your *analysis outcomes* from Workshop #1.
- Include diagrams, references, and any external sources used in your design approach.
- Pay particular attention to how **chaos theory** and **sensitivity analysis** inform your design decisions.
- Treat this design as an evolving blueprint. You will refine and expand upon it in subsequent workshops as your understanding deepens and requirements change.
- While the Kaggle competition provides a valuable dataset and problem statement, your system design should go beyond the competition itself. Explore the broader context, underlying challenges, and potential real-world applications or implications of the competition topic.

*Good luck, and continue building your skills as a **systems engineer** applying thorough analysis and design methodologies for complex data challenges!*