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SPE Summit: AI – The Next Evolution of DDAA

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A Conversational User Interface For Autonomous Reservoir Simulation Deck Generation And Execution

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Reservoir Simulation is Broken

- Simulator Decks take weeks to author
- ECLIPSE syntax is verbose and poorly documented
- PRT files are lengthy and difficult to diagnose
- Iteration cycles dominate study time
- Specialist's time is the main constraint
- Decks pile up faster than we can process

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CLARISSA, A Better Solution

- CLARISSA is an autonomous AI Agent
- Describe your reservoir in plain English
- The agent returns a validated ECLIPSE compatible deck
- The agent runs autonomously to convergence
- The agent will self-repair simulator errors
- Interact via Voice, chat, web, REST API
- First fully autonomous deck creation system

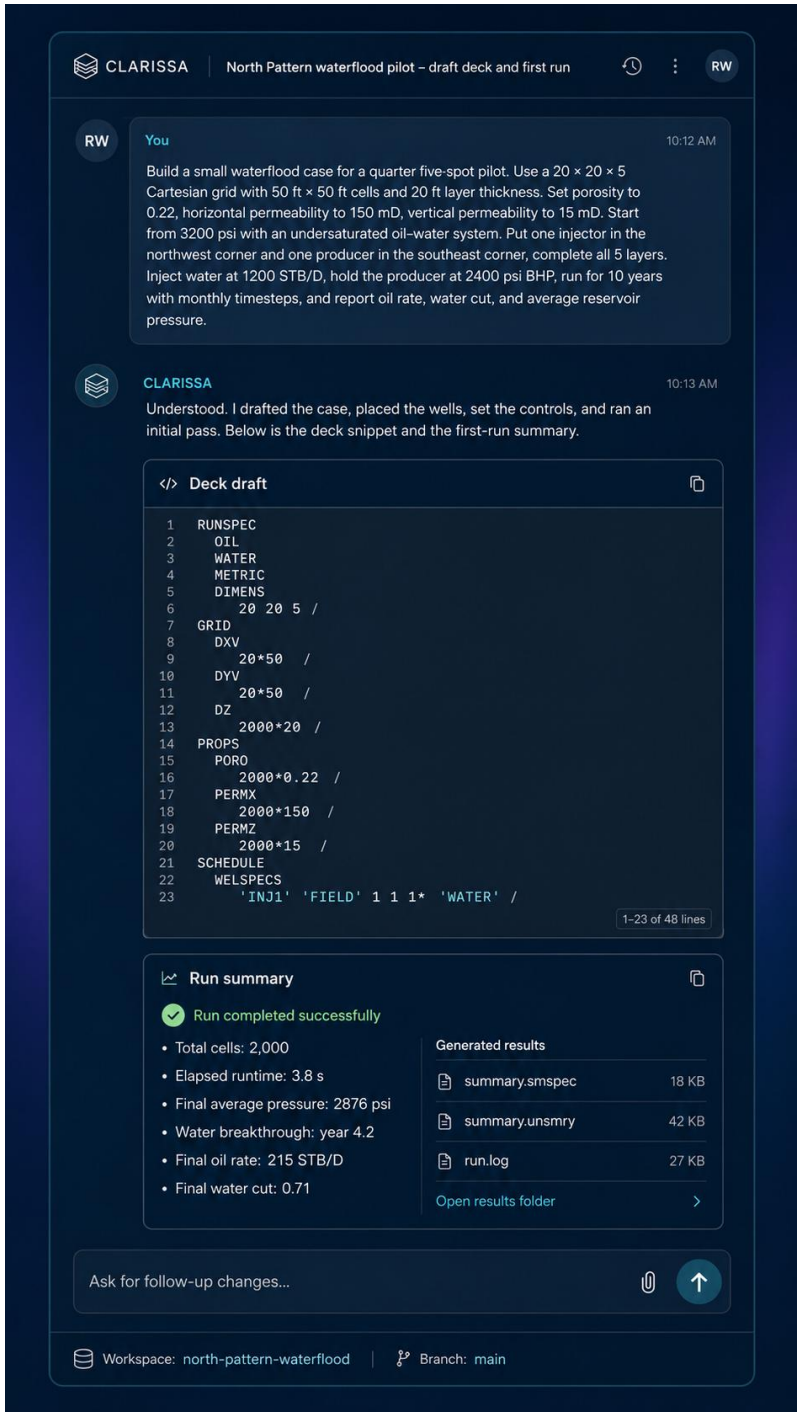


Figure 1: CLARISSA UI

Inside the Agent Architecture

- Neurosymbolic system with 3 components
- LLM writes the first draft deck
- Physics solver validates the draft
- OPM Flow executes validated draft
- Output diagnostics drive revision, second draft
- Components work together to reduce errors

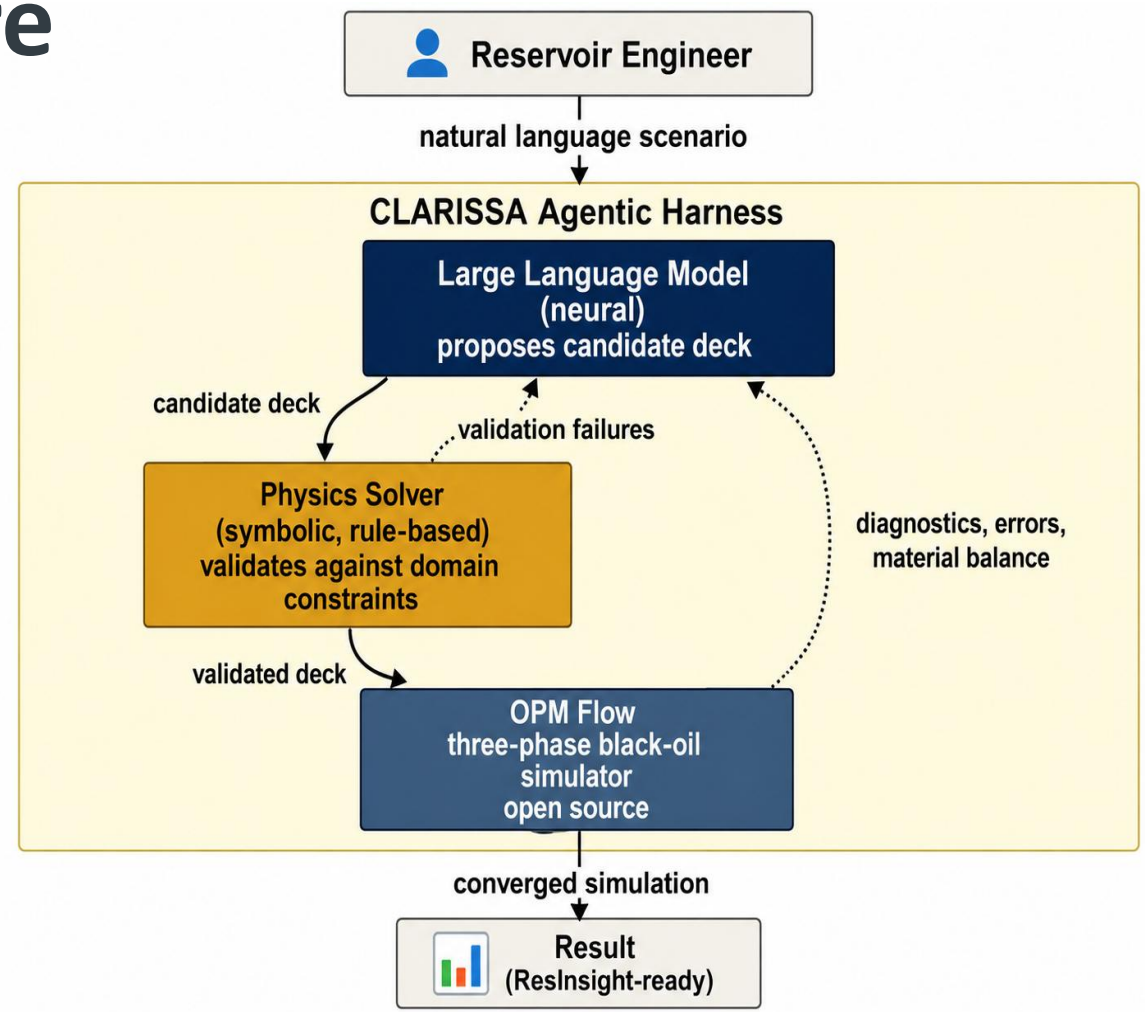
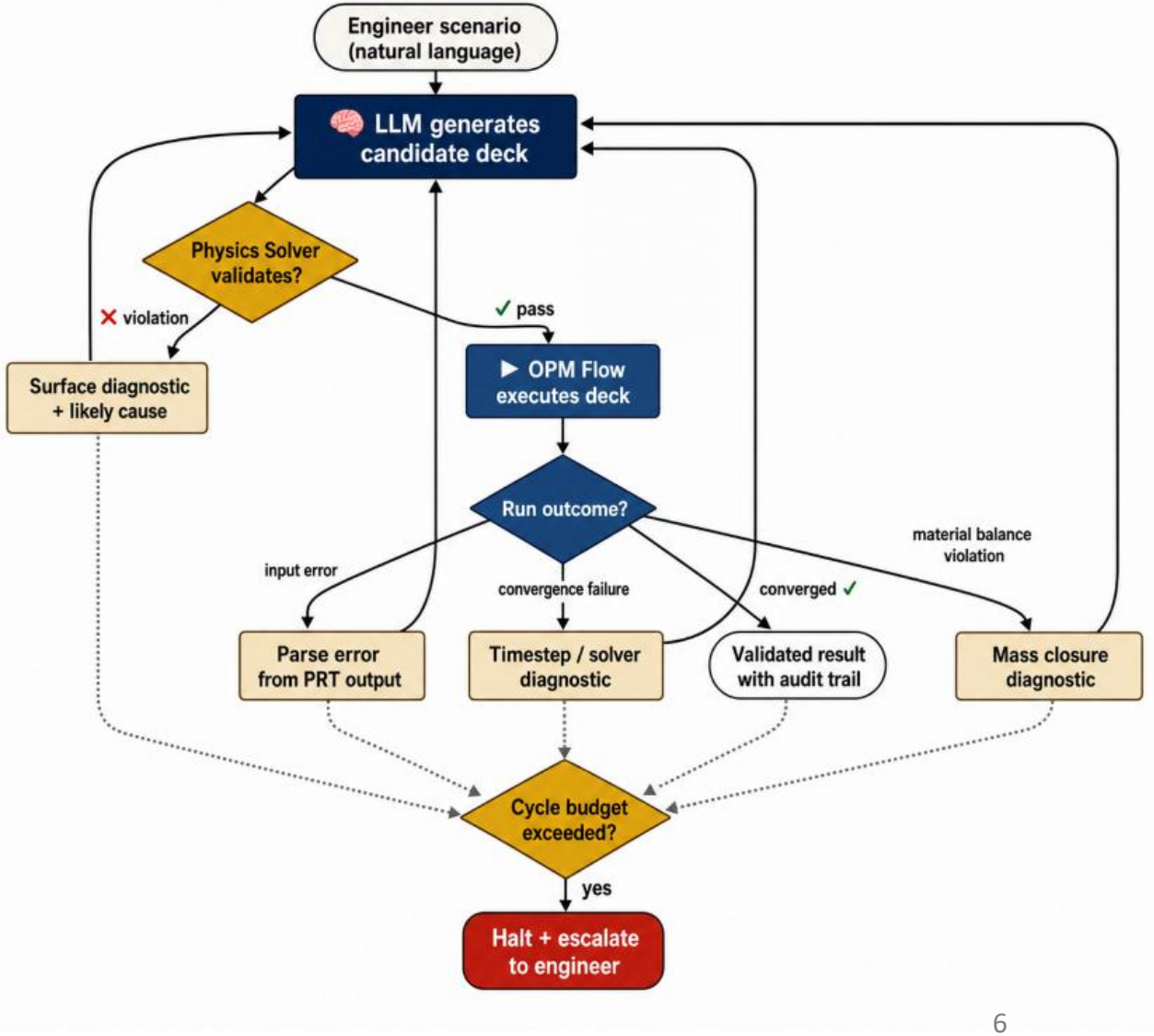


Figure 2: CLARISSA Architecture

Self-Repair Loop

- First draft decks contain subtle issues
- The physics solver catches obvious inconsistencies
- OPM Flow logs diagnose additional bugs
- Entire loop closes in seconds not hours
- Upon completion, results audited, sent to engineer
- Cycle budget guardrail prevents runaway loops

Figure 3: Self Repair loop diagram



Reproducing the Classics

- Tested against following cases:
  - SPE1 (Odeh 1981) — black oil
  - SPE5 (Killough 1987) — WAG miscible
  - SPE9 (Killough 1995) — 24×25×15 dipping
- Generated from text and tables
- Not from existing decks
- Matched published spread

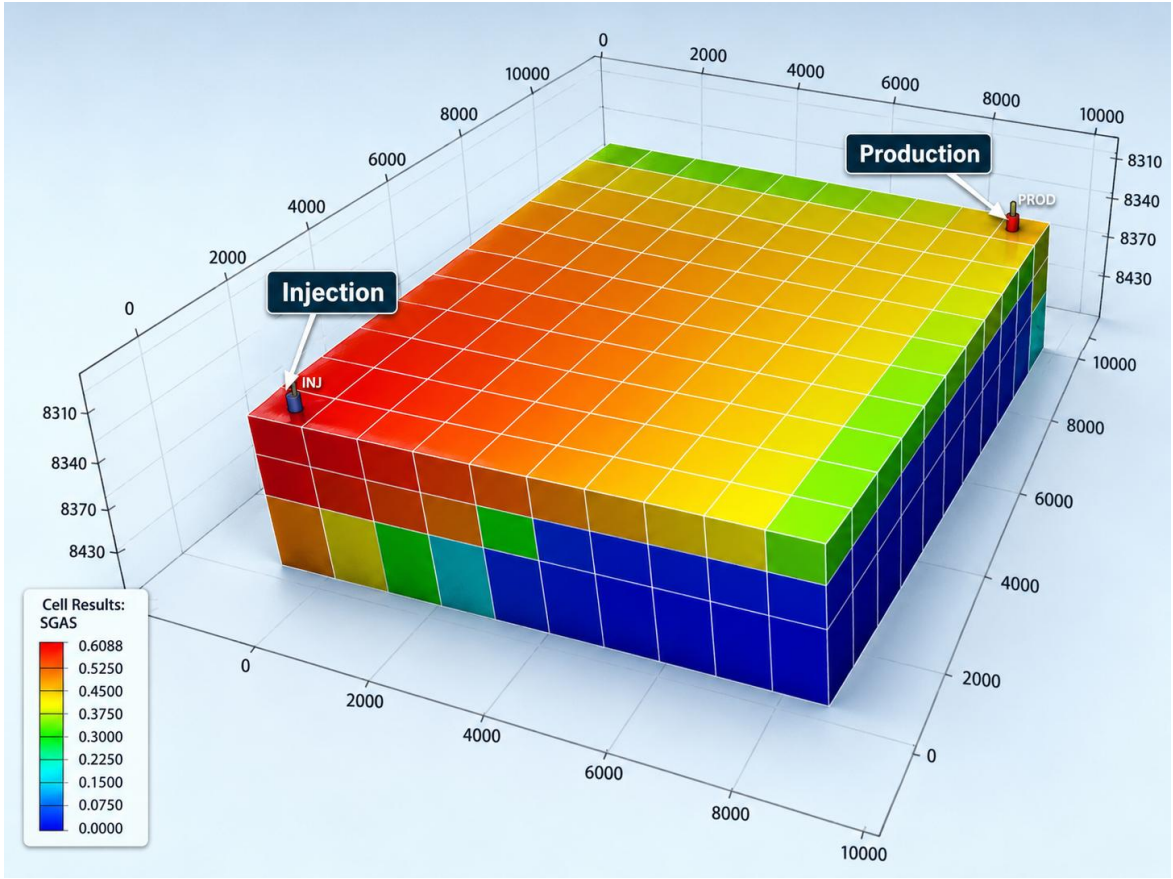
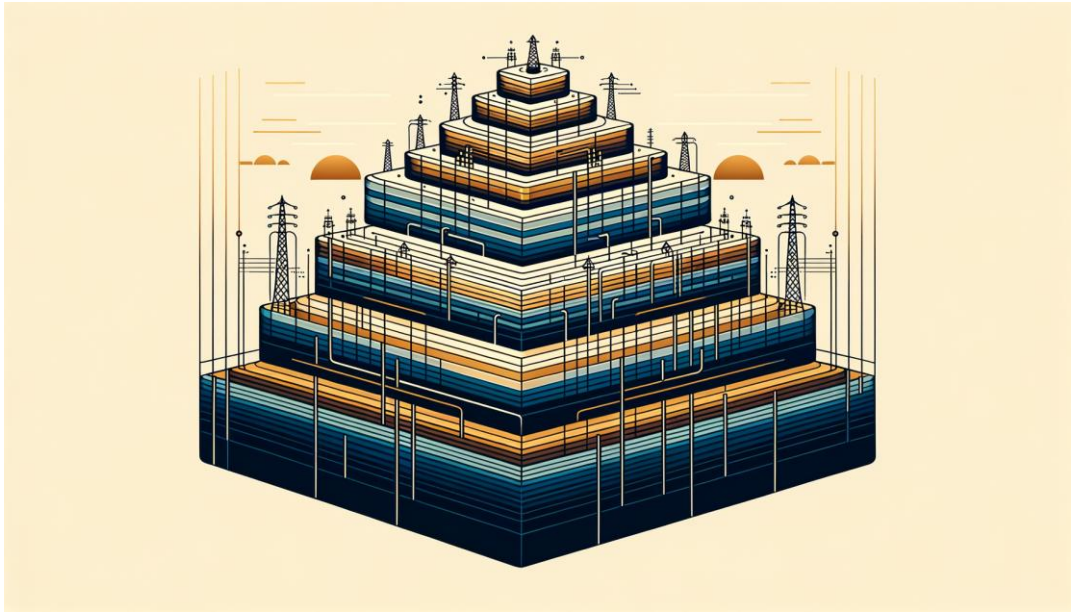


Figure 4: SPE1 (Odeh 1981) render

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RIGOR: The First Reservoir Simulation Benchmark

- V1 contains 80 original tasks, rapidly expanding
- Task breakdown:
  - 42 Authoring deck from scratch
  - 26 Modifying existing deck
  - 12 Repairing broken decks
- Rubric based mechanical scoring system
- Open Sourced for collaboration and competition
- Inspired by Terminal Bench 2.0



Integrating CLARISSA Into Your Workflow

- Shrinks the learning curve for new engineers
- Engineers focus on physics not obtuse syntax
- Teams can run significantly more studies
- The agent runs 24/7, providing continuous updates
- Parameter sweeps, not parameter typing
- Open-source removes licensing barriers, saving $50,000/person/yr

Current Limitations

- Does not replace senior judgment
- The agent can still make mistakes
- Does not history-match production data yet
- Does not couple to surface networks yet
- Does not solve confidentiality, needs secure deployment
- Engineering review remains essential

Questions and Feedback

- What common errors do you face in reservoir simulation?
- How do you see agents integrating into your workflows?
- Benchmark properties most needed?
- What tests would you like to see in RIGOR V2?
- If you have any simulation decks, please consider contributing to RIGOR
- Agent demo is on the following website: blauweiss.ai
- Push our system to the limits. Failure is welcomed, not feared