Perfect.
Below is the **complete, detailed execution document for Person 1**, written **exactly according to the guidelines and structure you specified**.

This document is **self-sufficient**, **easy to follow**, and **fully consistent** with:

- `context.md`
- the overall team plan
- the responsibilities of Person 2 and Person 3
- the final KRR-focused architecture

No overlap, no missing links, no ambiguity.

📄 Person 1 Execution Document

Role: Ontology & Knowledge Graph Engineer

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1. Role Overview

Primary Responsibility

You are responsible for designing, building, validating, and maintaining the **Mental Health Ontology** and the **base Knowledge Graph (KG)** that power the entire system.

Your work defines:

- **what concepts exist**
- **how they are related**
- **what relationships are allowed**
- **what the reasoning engine can reason over**

Every other component (NLP extraction, SWRL reasoning, causal explanations) **depends directly on your ontology design**.

You do **not** implement reasoning rules, NLP, ranking logic, or frontend features.

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2. What You Are Building (High-Level)

You will deliver:

1. A **formal OWL ontology** modeling mental-health–related concepts for students
2. A **base RDF knowledge graph** containing domain facts
3. A **graph management layer** to support session-based reasoning
4. **Dataset-informed ontology annotations**
5. Clear **documentation** that other team members depend on

This work is **pure Knowledge Representation**, not ML or heuristic logic.

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3. Inputs You Need Before Starting

Required Inputs

- `context.md` (final version)
- Agreed namespace (e.g., `mh:`)
- Agreement that:
  - ontology is **non-clinical**
  - reasoning will be done via SWRL by Person 3

Optional but Helpful

- Sample phrases from datasets (Figshare / Kaggle)
- Initial class list from project proposal

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4. Phase-by-Phase Task Plan

PHASE 1 — Ontology Foundations (CORE WORK)

Objective

Create a clean, logically consistent OWL ontology that models mental-health concepts relevant to students.

Tasks

1. Define Ontology Scope

- Confirm ontology purpose:
    - emotional well-being support
    - risk pattern representation
    - intervention recommendation
- Explicitly exclude:
    - diagnosis
    - disorders as medical claims

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2. Create Core Classes

You must define **at least** the following classes:

- `Emotion`
- `Symptom`
- `Trigger`
- `MentalState`
- `RiskLevel`
- `Intervention`
- `BehaviorPattern`
- `Student` (or equivalent agent class)

Each class must have:

- clear semantics
- rdfs:comment description
- no ambiguous overlap

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3. Create Subclass Hierarchies

Examples (not exhaustive):

Emotion

- Stress
- Anxiety
- Sadness

- Fear
- Irritability

Symptom

- Insomnia
- Fatigue
- DifficultyConcentrating
- SocialWithdrawal

Trigger

- ExamPressure
- AcademicWorkload
- FamilyPressure

MentalState

- AcademicStress
- AnxietyRisk
- BurnoutRisk
- PanicRisk

Intervention

- BreathingExercise
- GroundingTechnique
- Journaling
- TimeManagement
- TalkToCounselor

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4. Define Object Properties

Mandatory properties include:

- `experiencesEmotion`
- `hasSymptom`
- `triggeredBy`
- `associatedWith`
- `increasesRiskOf`
- `recommendedIntervention`

For each property:

- define domain & range
- define inverse (if meaningful)
- add human-readable comments

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5. Define Data Properties

Examples:

- `confidenceScore`
- `severityLevel`
- `persistenceCount`
- `durationDays`

These support:

- confidence estimation
- persistence tracking
- explanation clarity

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6. Ontology Constraints

- Add **disjointness** where appropriate:
    - Emotion Symptom
- Avoid over-constraining:
    - no clinical axioms
- Keep ontology **reasoner-friendly**

Checks You Must Perform

- Ontology consistency check in Protégé
- No unintended class equivalences
- Clear semantic separation between concepts

PHASE 2 — Dataset-Informed Ontology Validation

Objective

Ensure the ontology vocabulary reflects **real student expressions** without introducing ML inference.

Tasks

7. Review Datasets

- MHP Anxiety–Stress–Depression dataset
- Kaggle Mental Health Sentiment dataset

Focus on:

- common symptoms
- frequent emotions
- typical stressors

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8. Vocabulary Validation

- Check if ontology concepts cover:
  - dataset terms
  - common synonyms
- Add missing concepts **only if conceptually justified**

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9. Ontology Annotations

Add non-logical annotations:

- `rdfs:comment`
- optional `mh:causalStrength` (numeric or ordinal)

⚠️ These annotations:

- do NOT trigger reasoning
- may be used later for ranking explanations

Checks You Must Perform

- No dataset statistics used as axioms
- No probabilistic inference encoded
- Ontology remains purely symbolic

PHASE 3 — Base Knowledge Graph Construction

Objective

Create an RDF graph representing **domain knowledge**, not user-specific data.

Tasks

10. Encode Base Relationships

Examples:

- Insomnia `associatedWith` Anxiety
- AcademicStress `canLeadTo` AnxietyRisk
- AnxietyRisk `recommendedIntervention` BreathingExercise

These are **domain truths**, not session facts.

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11. Create Base Graph File

- `base_graph.ttl`
- Uses ontology URIs
- No user instances

Checks

- No user-specific triples
- No rule outcomes hard-coded
- Graph aligns with ontology constraints

PHASE 4 — Graph Manager Implementation

Objective

Enable session-based reasoning by managing temporary knowledge graphs.

Tasks

12. Implement Graph Manager

Responsibilities:

- load ontology
- load base graph
- create session subgraph
- insert triples from NLP output
- export session graph

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13. Support Persistence Tracking

- Store timestamps or counts
- Enable Person 3 to reason over persistence

Deliverable

- `graph_manager.py`
- Well-documented methods

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5. Integration With Other Members

What You Provide

To **Person 2 (NLP)**:

- ontology URI list
- synonym guidance
- class/property definitions

To **Person 3 (Reasoning)**:

- stable ontology structure
- property semantics
- base graph relationships

What You Need From Others

From **Person 2**:

- feedback on missing vocabulary

From **Person 3**:

- feedback on properties needed for rules

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6. Project Flow — Your Involvement

You are active in:

1. **Project start** — ontology design
2. **Mid-project** — validation & refinement
3. **Integration phase** — resolving semantic mismatches
4. **Final phase** — ontology freeze & documentation

You must **freeze ontology** before final rule testing.

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7. Final Deliverables Checklist

- [ ] Mental Health Ontology (`.owl` / `.ttl`)
- [ ] Base Knowledge Graph
- [ ] Graph Manager module
- [ ] Dataset validation notes
- [ ] Ontology documentation

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8. Success Criteria

Your work is successful if:

- Ontology is consistent and expressive
- Other members can build without ambiguity
- Reasoning rules map cleanly onto ontology
- Explanations are semantically grounded

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9. Important Boundaries (Do Not Cross)

❌ Do not write SWRL rules
❌ Do not implement NLP logic
❌ Do not define inference behavior
❌ Do not add clinical claims

Your strength is **representation, not reasoning**.

Final Note

This ontology is the **single source of truth** for the entire system.

If it is clean, consistent, and well-documented,
everything else in the project becomes easier, safer, and more explainable.
