Case Study 2: Compute Optimized Instances

1. Overview of Recommended Instance Series

Recommended Series: C5, C6i, C7g

The **C-series (Compute-optimized instances)** is designed for **applications that require high-performance CPUs** but **don't need a lot of memory**.

These instances are ideal when your tasks involve **heavy computation**, like data analytics, real-time processing, or machine learning inference — just like a **sports car made for speed**, not carrying passengers.

Quick Intro:

- **C5** – Proven and stable generation, Intel-based.
- **C6i** – Newer Intel-based, better price/performance than C5.
- **C7g** – Graviton3-based (ARM), faster and more energy-efficient.

2. Characteristics

Feature	C5	C6i	C7g
CPU	Intel Xeon	3rd Gen Intel Xeon	AWS Graviton3 (ARM)
Performance	High	Higher (up to 15% better than C5)	Even better performance per cost
Memory	Lower than general-purpose	Lower than M-series	Similar
Networking	Up to 25 Gbps	Better EBS and network	Great for cloud-native apps
Use Case Focus	CPU-intensive tasks	Modern workloads	ARM-optimized, future-ready

3. Why They Are Suitable

- These instances offer **high-performance CPUs**, making them ideal for:
    - **Complex calculations** (like financial simulations)
    - **Real-time processing** (like NLP chatbots)
    - Tasks that **scale across multiple vCPUs**

They **don't waste money on unused memory**, keeping things **cost-effective**.

4. Considerations Detailing the Instance Series

Scenario A: Monte Carlo Simulations – Hedge Fund

- Needs to run **thousands of simulations** quickly.
- Prioritizes **fast, multi-threaded CPU performance**.
- Memory needs are moderate.
- **Best Fit**: C6i – High vCPU performance, stable, Intel-optimized for legacy apps.

Scenario B: NLP Chatbot – AI Company

- Requires **real-time text processing** and quick response.
- Needs **low latency and fast CPU**, can work with less memory.
- **Best Fit**: C7g – Graviton3-powered, great performance-per-cost, ideal for cloud-native NLP models.

5. Comparison and Selection

Requirement	**C5**	**C6i**	**C7g**
Legacy compatibility	OK	Better	No, Only ARM-based Application
Price-to-performance	OK	Better	Best
Energy efficiency	No	OK	Best
AI/NLP performance	OK	Better	Best
Long-term scalability	OK	Better	Best

Selection:

- Choose **C6i** if using **Intel-based tools** or enterprise compatibility is key.
- Choose **C7g** if you're building **modern, cloud-native apps** and want **cost savings + performance**.

6. Key Considerations Supporting the Business Case

- **Predictable, High-CPU Performance**: Crucial for real-time systems or simulation-heavy workloads.
- **Scalability**: Can spin up many instances in parallel.
- **Cost Optimization**: Don't pay for excess memory.
- **Flexibility**:
    - C5/C6i: Work well with traditional applications.
    - C7g: Supports containerized workloads and modern DevOps pipelines.
- **Future-Ready**: C7g (Graviton3) aligns with cloud-native architecture and sustainable computing goals.

7. Conclusion

For compute-heavy workloads such as financial simulations and AI-powered chatbots, the **C-Series instances** (C5, C6i, C7g) provide the **best balance of CPU performance and cost efficiency**. While **C6i** is ideal for legacy and Intel-optimized tasks, **C7g** is the top choice for **modern cloud-native** applications, delivering superior **performance-per-dollar** and **energy efficiency**.

The right instance depends on tech stack, legacy requirements, and long-term cloud goals.