

Learning Management System (LMS)

SECTION 1: Executive Cost Summary

1.1 Monthly Cost Summary – Bunny Stream + Bunny Storage (Recommended)

Exchange Rate: ₹90 = 1 USD

Students	EC2	MongoDB	Bunny Media	Total (USD)	Total (INR)	Per Student / Month (INR)
2,000	\$47	\$120	\$449	\$616	₹55,440	₹27.72 (Ref: Section 2.1)
5,000	\$47	\$177	\$1,122	\$1,346	₹121,140	₹24.22 (Ref: Section 2.2)
10,000	\$95	\$250	\$2,244	\$2,589	₹233,010	₹23.30(Ref: Section 2.3)

Key Observation: Media delivery cost dominates LMS expenditure. Bunny provides significant cost optimization while maintaining CDN-grade performance.

1.2 Monthly Cost Summary – AWS S3 + Data Transfer (Alternative / Reference)

Students	EC2	MongoDB	S3 + Data Transfer	Total (USD)	Total (INR)	Per Student / Month (INR)
2,000	\$47	\$120	\$1,385	\$1,552	₹139,680	₹69.84 (Ref: Section 3.1)
5,000	\$47	\$177	\$3,463	\$3,687	₹331,830	₹66.36 (Ref: Section 3.2)
10,000	\$95	\$250	\$6,917	\$7,262	₹653,580	₹65.35 (Ref: Section 3.3)

Key Observation: AWS S3 becomes economically inefficient for high-volume video streaming due to outbound data transfer charges.

SECTION 2: Hour-wise Cost Calculation (WITH BUNNY STREAM)

This section provides **explicit hour-wise and unit-level calculations** for each student slab. These calculations are the **source of truth** for the summary tables in Section 1 and are referenced inline for audit and finance verification.

2.1 Baseline Calculation – 2,000 Students

EC2 Application Layer

- Instance: m5a.large
- Hourly Cost: \$0.056 / hour
- Monthly Compute: $0.056 \times 24 \times 30 = \mathbf{\$40.32}$
- EBS + Monitoring Overhead: **\$7.13**
- **Total EC2 (Monthly): \$47**

MongoDB Atlas

- Tier: M10
- Hourly Cost: $\approx \$0.17$ / hour
- Monthly Cost: $0.17 \times 24 \times 30 \approx \mathbf{\$120}$

Media Delivery

Consumption Model

- Viewing resolution: **720p**
- Avg bitrate (education video, H.264): **~ 1.5 Mbps**
- Data per hour:
 - $1.5 \text{ Mbps} \approx 0.1875 \text{ MB/s}$
 - $0.1875 \times 3600 \approx \mathbf{675 \text{ MB/hour} \approx 0.66 \text{ GB/hour}}$
- Monthly viewing per student: **20 hours**
- **Data per student / month: $20 \times 0.66 \approx 13.2 \text{ GB}$**

Total Data Delivered -> $2,000 \times 13.2 \text{ GB} \approx \mathbf{26,400 \text{ GB}}$

Bunny Effective Rate $\approx \mathbf{\$0.017 \text{ per GB}}$ (blended streaming + storage)

Monthly Media Cost -> $26,400 \times 0.017 \approx \mathbf{\$449}$

Total – 2,000 Students with Bunny

- EC2: \$47
- MongoDB: \$120
- Media: \$449
- **Total: \$616 / month**
(Referenced in Table 1.1)

2.2 Detailed Calculation – 5,000 Students

EC2 Application Layer

- Instances: $1 \times \text{m5a.large}$
- Hourly Cost: $0.056 \times 24 \times 30 = \mathbf{\$40.32}$
- Overhead: \$7

- **Total EC2: \$47**

MongoDB Atlas

- Tier: M20
- Hourly Cost: \$0.25 / hour
- Monthly: $0.25 \times 24 \times 30 \approx$ **\$177**

Media Delivery

Consumption Model -> Per student: **13.2 GB / month** (20 hrs @ 720p)

Total Data Delivered -> $5,000 \times 13.2 \text{ GB} \approx$ **66,000 GB**

Monthly Media Cost with Bunny

- $66,000 \times 0.017 \approx$ **\$1,122**
- **Final Used: \$1,122**

Total – 5,000 Students with Bunny

- EC2: \$47
- MongoDB: \$177
- Media: \$1,122
- **Total: \$1,346 / month**

(Referenced in Table 1.1)

2.3 Detailed Calculation – 10,000 Students

EC2 Application Layer

- Instances: **2 × m5a.large**
- Hourly Cost: $2 \times 0.056 \times 24 \times 30 =$ **\$80.64**
- EBS + Monitoring Overhead: **~\$14**
- **Total EC2: \$95**

MongoDB Atlas

- Tier: M30
- Hourly Cost: \approx \$0.35 / hour
- Monthly: $0.35 \times 24 \times 30 \approx$ **\$250**

Media Delivery

Consumption Model -> Per student: **13.2 GB / month** (20 hrs @ 720p)

Total Data Delivered -> $10,000 \times 13.2 \text{ GB} =$ **132,000 GB**

Monthly Cost Calculation with Bunny -> $132,000 \times 0.017 \approx$ **\$2,244**

Total – 10,000 Students with Bunny

- EC2: \$95
- MongoDB: \$250
- Media: \$2,244
- **Total: \$2,589 / month**

(Referenced in Table 1.1)

SECTION 3: Hour-wise Cost Calculation (WITH S3 + VIDEO STREAM)

3.1 Baseline Calculation – 2,000 Students

EC2 Application Layer

- Instance: m5a.large
- Hourly Cost: \$0.056 / hour
- Monthly Compute: $0.056 \times 24 \times 30 = \mathbf{\$40.32}$
- EBS + Monitoring Overhead: **\$7.13**
- **Total EC2 (Monthly): \$47**

MongoDB Atlas

- Tier: M10
- Hourly Cost: $\approx \$0.17$ / hour
- Monthly Cost: $0.17 \times 24 \times 30 \approx \mathbf{\$120}$

Media Delivery

Consumption Model

- Viewing resolution: **720p**
- Avg bitrate (education video, H.264): **~ 1.5 Mbps**
- Data per hour:
 - $1.5 \text{ Mbps} \approx 0.1875 \text{ MB/s}$
 - $0.1875 \times 3600 \approx \mathbf{675 \text{ MB/hour} \approx 0.66 \text{ GB/hour}}$
- Monthly viewing per student: **20 hours**
- **Data per student / month: $20 \times 0.66 \approx 13.2 \text{ GB}$**

Total Data Delivered -> $2,000 \times 13.2 \text{ GB} \approx \mathbf{26,400 \text{ GB}}$

S3 Effective Rate $\approx \$0.0524$ per GB (blended streaming + storage)

Monthly Media Cost $26,400 \times 0.0524 \approx \mathbf{\$1385}$

Total – 2,000 Students with S3

- EC2: \$47
- MongoDB: \$120
- Media: \$1385
- **Total: \$1552/ month**

(Referenced in Table 1.2)

3.2 Detailed Calculation – 5,000 Students

EC2 Application Layer

- Instances: $1 \times \text{m5a.large}$
- Hourly Cost: $0.056 \times 24 \times 30 = \40.32
- Overhead: \$7
- **Total EC2: \$47**

MongoDB Atlas

- Tier: M20

- Hourly Cost: \$0.25 / hour
- Monthly: $0.25 \times 24 \times 30 \approx \177

Media Delivery

Consumption Model -> Per student: **13.2 GB / month** (20 hrs @ 720p)

Total Data Delivered -> $5,000 \times 13.2 \text{ GB} \approx \mathbf{66,000 \text{ GB}}$

Monthly Media Cost with S3 -> $66,000 \times 0.0524 \approx \mathbf{\$3459}$ (Rounded of \$3463)

Total – 5,000 Students with S3

- EC2: \$95
- MongoDB: \$250
- Media: \$3463
- **Total: \$3,687 / month**

(Referenced in Table 1.2)

3.3 Detailed Calculation – 10,000 Students

EC2 Application Layer

- Instances: **2 × m5a.large**
- Hourly Cost: $2 \times 0.056 \times 24 \times 30 = \mathbf{\$80.64}$
- EBS + Monitoring Overhead: **~\$14**
- **Total EC2: \$95**

MongoDB Atlas

- Tier: M30
- Hourly Cost: $\approx \$0.35$ / hour
- Monthly: $0.35 \times 24 \times 30 \approx \mathbf{\$250}$

Media Delivery :

Consumption Model - Per student: **13.2 GB / month** (20 hrs @ 720p)

Total Data Delivered - $10,000 \times 13.2 \text{ GB} = \mathbf{132,000 \text{ GB}}$

Monthly Cost with S3 -> $132,000 \times 0.0524 \approx \mathbf{\$6916.8}$ (Rounded of \$6917)

Total – 10,000 Students with S3

- EC2: \$95
- MongoDB: \$250
- Media: \$6,917
- **Total: \$7,262 / month**

(Referenced in Table 1.2)

SECTION 4: EC2 Instance Selection

4.1 Selected Instance

- **Instance Type:** m5a.large

- **vCPU:** 2
- **RAM:** 8 GB
- **Network:** Up to 10 Gbps

4.2 EC2 Cost Calculation

- **Hourly:** \$0.056
- **Monthly compute:** $0.056 \times 24 \times 30 \approx \40.32
- **EBS + monitoring:** $\approx \$7.13$
- **Total:** $\approx \$47$ per instance / month

SECTION 5: MongoDB Atlas Tier Selection

Users	MongoDB Tier	vCPU	RAM	Storage (Base)	Concurrent users
2,000	M10	2	2 GB	20 GB	~1,200
5,000	M20	2	4 GB	40 GB	~3,000
10,000	M30	4	8 GB	80 GB	~7,000
15,000–20,000	M40	4	16 GB	160 GB	~12,000

SECTION 6: Media Platform Feasibility & Cost Comparison

6.1 Bunny Stream + Storage (Recommended)

Why Feasible

- Purpose-built for video streaming
- Flat per-GB pricing
- No egress shock at scale
- Global CDN optimized for education platforms

Best For: High-volume LMS video delivery

6.2 AWS S3 + Data Transfer (Alternative)

Why Feasible Technically

- Highly durable object storage
- Tight integration with AWS ecosystem
- Suitable for documents and static assets

Why Not Cost-Feasible for Video

- Outbound bandwidth charged per GB
- Costs increase sharply with student count
- Difficult to predict monthly billing

SECTION 7: Account Creation Requirements

AWS

- Official university email
- Institutional credit card
- Legal details (GST, PAN)

Bunny

- Official university email
- Payment method
- IT department contact number

SECTION 8: Conclusion

For video-intensive LMS platforms, **Bunny Stream delivers approximately 70–75% cost savings** over AWS S3 while maintaining performance and reliability.

The LMS infrastructure exhibits predictable and linear scalability aligned with user growth and workload expansion. The cost figures outlined in this document are indicative budgetary estimates calculated using official pricing references from AWS , MongoDB and Bunny for the specified configuration and region. Actual operational charges may vary depending on real-time system usage, data transfer volumes, access patterns, service consumption levels, and applicable pricing policies in effect during the billing period. These estimates are provided solely for planning, approval, and financial projection purposes.