

DevOps Roadmap for 2nd-Year B.Sc. CS Student (Zero Knowledge)

Start Date: 15 Nov 2025 | Location: India
Current Time: 15 Nov 2025, 09:10 PM IST

GOAL

Become a **job-ready Junior DevOps Engineer** by **May 2027** (end of 3rd year) with **full-stack-aware automation skills**.

PHASE 0: APPLICATION FUNDAMENTALS (Nov 2025 – Jan 2026)

Duration: 2.5 months | Focus: Build → Understand → Automate

Sub-Phase	What to Learn	Description	When	Why	Outcome
OA: Application Architecture & Design	Monolith vs Microservices, 3-Tier Architecture, RESTful APIs, 12-Factor App Principles	Study how real-world apps are structured: Frontend → Backend → Database. Learn API design, statelessness, and scalability patterns.	Nov 15 – Dec 5	DevOps automates what developers build . You must know what you're deploying.	Architecture diagram of a Todo App (Web + API + DB)
OB: Application Development	Build a functional backend API (Flask/Express/Spring Boot) with CRUD operations and database integration	Write clean, modular code with proper separation of concerns. Connect to SQLite/PostgreSQL.	Dec 6 – Dec 25	Hands-on coding builds intuition for build, test, and deployment stages.	Working Todo API with 5+ endpoints
OC: Build & Compile Process	Dependency management, build scripts, artifact generation, environment isolation	Learn how code becomes a deployable unit (e.g., <code>requirements.txt</code> , <code>virtualenv</code> , build folders).	Dec 26 – Jan 10	CI/CD starts with reproducible builds . No build = no automation.	<code>build.sh</code> script that generates a clean, testable artifact

PHASE 1: VERSION CONTROL & COLLABORATION (Jan 2026)

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Duration: 2 weeks

Concept	Description	When	Why	Outcome
Git Workflow & GitHub	Branching, Pull Requests, <code>.gitignore</code> , commit conventions, README	Jan 11 – Jan 25	Source of truth for code. CI/CD triggers on Git events.	Public GitHub repo with clean history and documentation

PHASE 2: AUTOMATED TESTING (Jan – Feb 2026)

Duration: 2 weeks

Concept	Description	When	Why	Outcome
Unit & Integration Testing	Write tests for API endpoints using PyTest/Jest	Jan 26 – Feb 10	Prevent regressions. CI fails fast if tests break.	80%+ test coverage on core logic

PHASE 3: CONTAINERIZATION (Feb – Apr 2026)

Duration: 2 months

Concept	Description	When	Why	Outcome
Docker Fundamentals	Images, containers, Dockerfile, layers, portability	Feb 11 – Mar 5	Ensures same app runs everywhere (dev, CI, prod).	Dockerized Todo App
Docker Compose	Multi-container apps (App + DB)	Mar 6 – Mar 20	Simulates production-like environments locally.	<code>docker-compose.yml</code> with app + DB
Image Optimization & Registry	Multi-stage builds, Docker Hub	Mar 21 – Apr 5	Smaller, secure, versioned images.	Published image on Docker Hub

PHASE 4: CI/CD AUTOMATION (Apr – May 2026)

Duration: 1.5 months

Concept	Description	When	Why	Outcome
GitHub Actions	Workflow YAML, jobs, steps, triggers, secrets	Apr 6 – Apr 25	Automate: Lint → Test → Build → Push	Fully automated pipeline

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Pipeline as Code	Store CI config in repo	Apr 26 – May 10	Version control for automation. Auditability.	<code>.github/workflows/ci-cd.yml</code>
Artifact & Image Versioning	Tag images with Git SHA	May 11 – May 20	Traceability: "Which code is running in prod?"	Versioned Docker images

PHASE 5: INFRASTRUCTURE AS CODE & CLOUD (May – Aug 2026)

Duration: 3 months

Concept	Description	When	Why	Outcome
Cloud Fundamentals (AWS)	EC2, VPC, Security Groups, IAM, S3	May 21 – Jun 10	Most Indian companies use AWS. Free Tier available.	AWS Free Tier account with VPC
Terraform	Declarative IaC, state, modules	Jun 11 – Jul 5	Reproducible, versioned infrastructure	<code>main.tf</code> deploying EC2 + Docker
Cloud Deployment	Pull Docker image, run on EC2	Jul 6 – Jul 20	Real-world deployment target	Live app on AWS
Cost & Cleanup	<code>terraform destroy</code> , Free Tier limits	Jul 21 – Aug 1	Avoid bill shock. Responsible engineering.	Clean teardown script

PHASE 6: ORCHESTRATION & SCALING (Aug – Oct 2026)

Duration: 2.5 months

Concept	Description	When	Why	Outcome
Kubernetes Basics	Pods, Deployments, Services, Minikube	Aug 2 – Aug 25	Industry standard for scaling and resilience	k8s cluster running Todo App
Manifests as Code	YAML for Deployment, Service, Ingress	Aug 26 – Sep 10	Infra-like-code for containers	<code>k8s/</code> folder in repo
Scaling & Self-Healing	Replicas, HPA, Liveness probes	Sep 11 – Sep 25	Handle traffic spikes, auto-restart	3-pod deployment with auto-scaling
Local to Cloud (Optional)	Kind, GKE/EKS preview	Sep 26 – Oct 10	Prepare for cloud k8s	Ready for CKA

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PHASE 7: OBSERVABILITY (Oct – Nov 2026)

Duration: 1.5 months

Concept	Description	When	Why	Outcome
Logging	Centralized logs (Loki/ELK)	Oct 11 – Oct 25	Debug production issues	View app logs in dashboard
Metrics	Prometheus scraping	Oct 26 – Nov 5	Measure health, performance	CPU/RAM graphs
Dashboards	Grafana visualization	Nov 6 – Nov 15	One place to observe all	Live monitoring dashboard

PHASE 8: CERTIFICATION & JOB PREP (Nov 2026 – May 2027)

Duration: 6 months (parallel)

Task	Description	When	Why	Outcome
AWS Certified DevOps Engineer – Associate	Official AWS exam	Nov 2026 – Jan 2027	Most valued in India (TCS, Infosys, startups)	Certification badge
Build Portfolio	4 GitHub projects	Ongoing	Recruiters check repos	Pinned repos with READMEs
Resume & LinkedIn	Highlight projects, CI/CD, k8s	Jan – Feb 2027	Stand out in fresher pool	5+ internship applications
Mock Interviews	Pramp, Interviewing.io	Mar – Apr 2027	Practice explaining architecture	Confident communication
Apply	Internshala, LinkedIn, Naukri, company portals	Apr – May 2027	Secure internship or PPO	Junior DevOps Role

12-MONTH TIMELINE (Nov 2025 – Nov 2026)

Month	Focus
Nov 2025	App Architecture + Design
Dec 2025	Build API + Compile Process
Jan 2026	Git + Testing
Feb–Mar 2026	Docker + Compose

Dec 2025	Backend API + Compose + Kubernetes
Jan 2026	Git + Testing
Feb–Mar 2026	Docker + Compose
Apr–May 2026	GitHub Actions CI/CD
Jun–Jul 2026	AWS + Terraform
Aug–Sep 2026	Kubernetes
Oct–Nov 2026	Monitoring + Logging
Nov 2026+	Cert + Apply

FINAL PORTFOLIO (GitHub)

1. **Todo App** – Full architecture, code, tests
2. **Docker Setup** – Dockerfile, Compose, optimization
3. **CI/CD Pipeline** – GitHub Actions automation
4. **IaC Deployment** – Terraform + AWS
5. **k8s Cluster** – Manifests, scaling, monitoring

JOB-READY CHECKLIST

- ☐ Designed 3-tier app from scratch
- ☐ Built reproducible artifact
- ☐ Containerized with Docker
- ☐ Automated with CI/CD
- ☐ Deployed with Terraform on AWS
- ☐ Scaled with Kubernetes
- ☐ Monitored with Grafana
- ☐ AWS Certified (or preparing)

Start Today (15 Nov 2025, 09:10 PM IST):

Draw your **Todo App architecture diagram** and push to GitHub.

Next Step: Share your repo link — I'll review it.
