

Cloud Computing in India

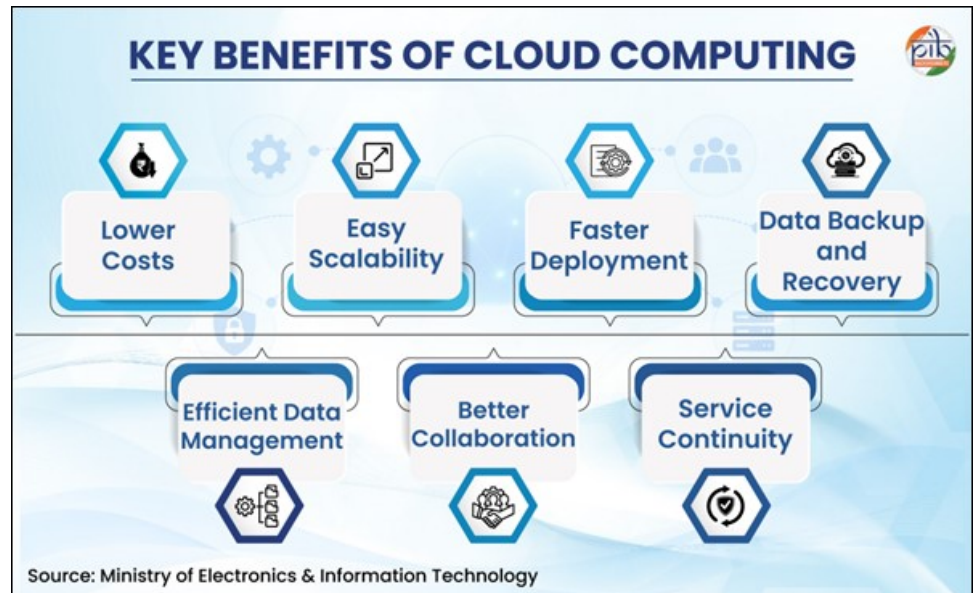
Mains: GSIII – Infrastructure

Why in News?

The cloud computing is central to India's digital transformation, enabling efficient data storage, processing and management. It supports e-governance, economic growth and AI development.

What is Cloud Computing?

- **Cloud computing** – It provides on-demand access to servers, storage, software and processing power over the internet.
 - Instead of owning, and maintaining physical data centers or hard drives, you rent access to these resources from a cloud service provider (CSP).
- **Major Cloud Deployment Models**
 - **Public Cloud** Shared infrastructure managed by third-party providers. It offers flexibility and scalability.
 - **Private Cloud** Dedicated infrastructure for a single organisation. It provides greater control over sensitive data.
 - **Hybrid Cloud** Combines public and private clouds. It balances flexibility, cost and security.
- **Major Cloud Service Models**
 - **Infrastructure as a Service (IaaS)** Provides virtual servers, storage and networks.
 - Organisations manage their computing resources.
 - **Platform as a Service (PaaS)** Provides platforms for developing and deploying applications.
 - It reduces infrastructure management.
 - **Software as a Service (SaaS)** Delivers ready-to-use applications online.
 - It reduces installation and maintenance requirements.



Why is Cloud Computing Important for India?

- **Strengthening Digital Governance** - Enables scalable government services. It improves administrative efficiency and reduces infrastructure duplication.
 - Supports DigiLocker, MyGov and the National Scholarship Portal. These platforms improve public service delivery.
- **Promoting Economic Growth** - Reduces investment in physical computing infrastructure. It makes digital adoption affordable for start-ups and MSMEs.
 - Promotes innovation, entrepreneurship and employment. Opportunities include cloud architecture, cybersecurity and data management.
- **Enabling Artificial Intelligence** - AI requires substantial computing power and data-processing capabilities.
 - Cloud infrastructure provides these resources.
 - Shared computing facilities benefit researchers, start-ups and academic institutions. They reduce investment in expensive equipment.
 - **Enhancing Data Sovereignty** - Domestic cloud infrastructure strengthens control over sensitive government, financial and citizen data.
 - It reduces dependence on overseas infrastructure.
 - Supports technological self-reliance and strategic autonomy. However, domestic data storage alone does not ensure complete data control.
- **Improving Business Resilience** - Cloud-based backup and recovery systems restore operations after disruptions.
 - They protect against equipment failures and cyberattacks.
 - Scalable infrastructure accommodates changing business demands. It also supports collaboration and operational continuity.

What are the Major Initiatives to Strengthen India's Cloud Ecosystem?

- **MeghRaj - GI Cloud** - Launched by MeitY in 2014 to accelerate e-governance and improve ICT resource utilisation.
 - MeghRaj 2.0 provides infrastructure, platform and software services. By September 2026, it covered 2,330 government departments.
- **National Informatics Centre (NIC)** - Operates four National Data Centres and 24

Mini Data Centres. They provide hosting, co-location and cloud services.

- NIC State Centres support state-level e-governance. They strengthen government digital infrastructure.
- **IndiaAI Mission** - Approved with an outlay of ₹10,371.92 crore to strengthen India's AI ecosystem.
 - Over 45,000 GPUs have been onboarded for common AI computing. This improves access to advanced computing resources.
- **Data Centre Expansion** - India's data centre capacity reached 1.57 GW in August 2026. It is projected to reach 8 GW by 2030.
 - Around \$70 billion in investments are underway, with another \$90 billion announced. These will expand cloud and AI infrastructure.
- **Cloud Selection Framework** - Issued by MeitY in March 2026 to guide government cloud selection. It considers data sensitivity and criticality.
 - Prioritises government-backed infrastructure and hybrid deployments. It also permits empanelled cloud providers.

What are the Major Challenges Facing India's Cloud Ecosystem?

- **Data Security and Privacy** - Centralised data storage increases cyberattack and data-breach risks. Sensitive information may face unauthorised access.
 - Weak security undermines public trust. It can also disrupt essential digital services.
- **Dependence on Foreign Technology** - Dependence on foreign providers, hardware and proprietary technologies creates strategic vulnerabilities.
 - It may increase external technological dependence.
 - Domestic data storage does not ensure complete control. Foreign-owned providers may still manage infrastructure and data processing.
- **High Infrastructure Costs** - Data centres require heavy investment in land, electricity, cooling and connectivity.
 - This creates entry barriers for smaller providers.
 - Rising AI computing demand increases operational costs. It may also affect service affordability.
- **Energy and Environmental Concerns** - Data centres consume substantial electricity and water. This increases pressure on energy and water resources.
 - Unplanned expansion increases emissions and environmental stress. Sustainable infrastructure is essential.
- **Skill Gaps and Digital Divide** - Cloud operations require expertise in cybersecurity, data engineering and architecture.
 - Skill shortages affect security and efficiency.
 - Poor connectivity and digital literacy restrict access. Rural communities and smaller organisations face greater adoption barriers.

What Should be the Way Forward?

- **Strengthening Data Protection and Cybersecurity** - Implement the Digital Personal Data Protection Act, 2023 effectively.
 - Improve incident response and cybersecurity standards. Prioritise government

and critical digital infrastructure.

- **Promoting Indigenous Cloud Capabilities** - Develop domestic cloud platforms, data centre technologies and computing hardware.
 - Reduce foreign dependence while retaining global cooperation.
- **Developing Sustainable Data Centres** - Integrate sustainability standards into infrastructure planning. Improve long-term resource efficiency.
- **Expanding Access and Building Skills** - Improve rural connectivity and digital infrastructure.
 - Provide affordable cloud and AI computing resources to MSMEs and institutions.

What lies ahead?

- Cloud computing is essential for India's digital transformation, economic growth and AI ambitions.
- Addressing security, technological dependence, environmental concerns and skill shortages is crucial.
- India must promote indigenous innovation, sustainable infrastructure and inclusive access to build a secure, affordable and sovereign cloud ecosystem.

Reference

[DD News| How India is building its cloud computing ecosystem](#)

