

# Digital Education Prototype & Visualization

Demonstrating how our inclusive education platform operates in low-bandwidth environments

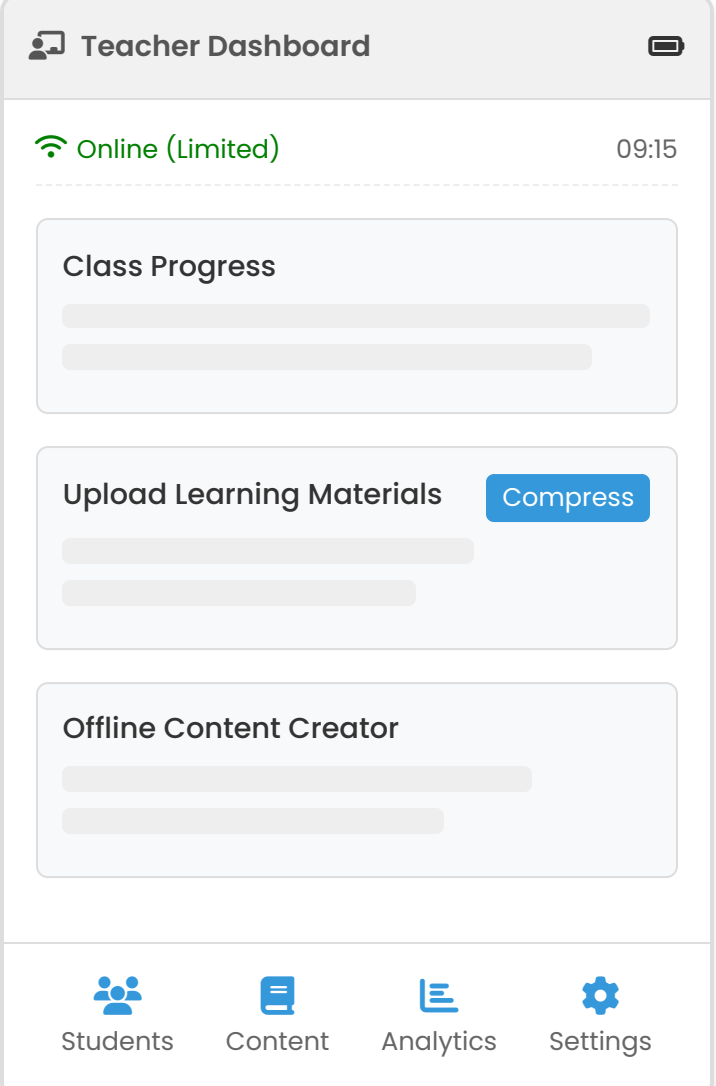
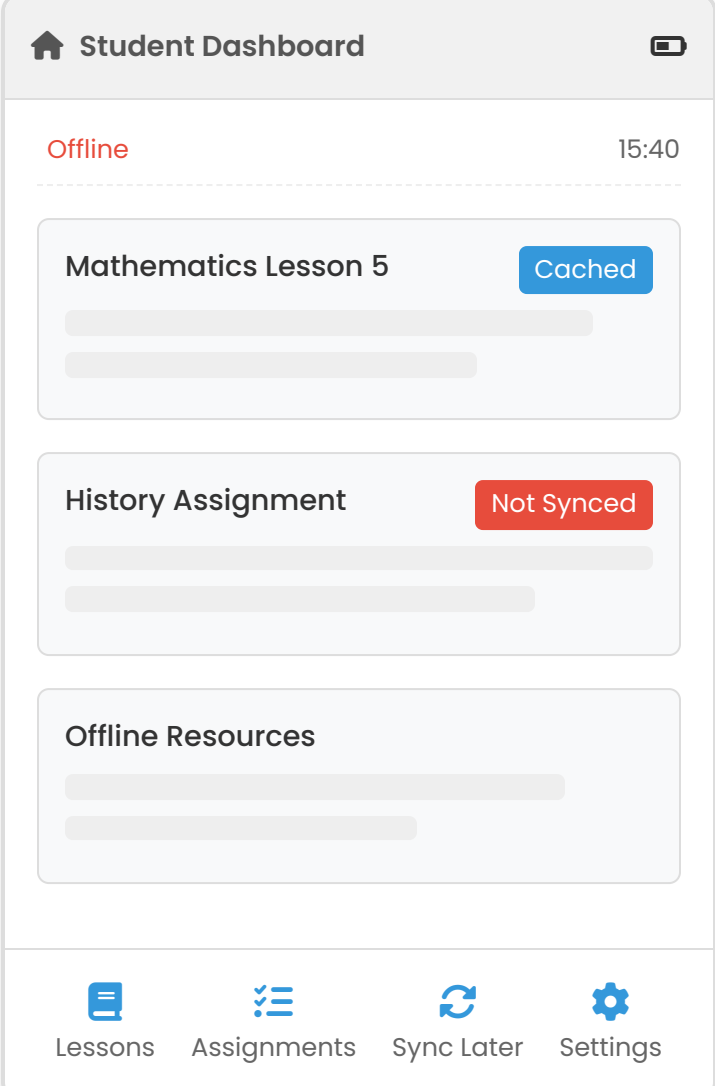
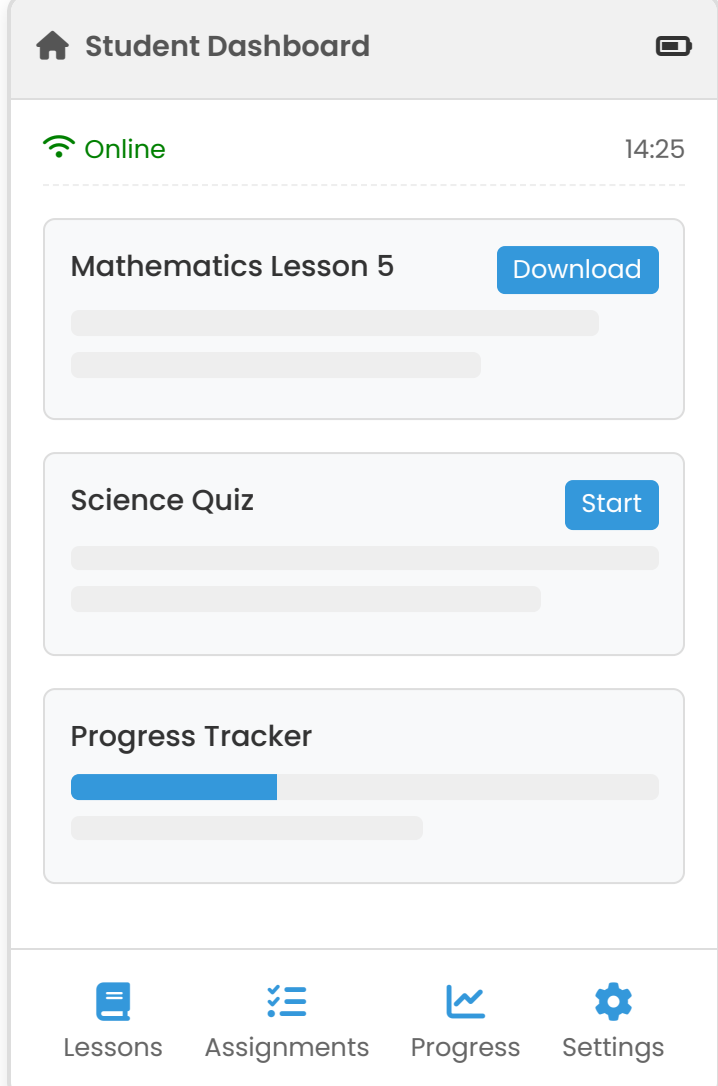
## Interactive Wireframes

These wireframes demonstrate how students and teachers can continue to use the education platform even when internet connectivity is limited or unavailable. Our offline-first approach ensures learning continuity in rural areas with intermittent connections.

"I'm Thabo, a Grade 10 student from Limpopo. I often have trouble connecting to the internet, but with this app I can still access my lessons and submit assignments later when connectivity returns."



Thabo, Student



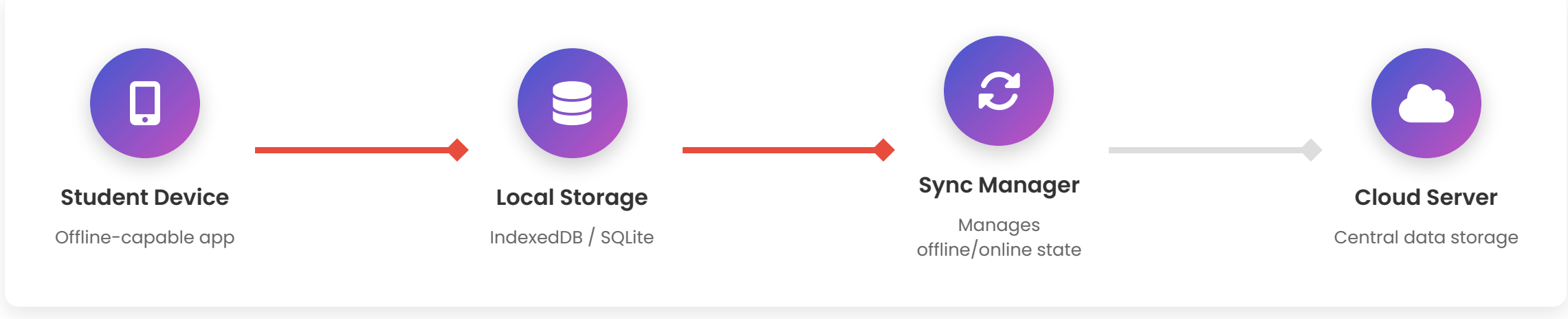
"As a teacher in a rural school, I need tools that work regardless of connectivity. This platform allows me to prepare content offline and distribute it to students even when the internet is down."



Ms. Khumalo, Teacher

## Data Flow Diagrams

These diagrams illustrate how data flows between offline and online states in our platform. The system uses intelligent synchronization to manage data transfers efficiently over low-bandwidth connections, prioritizing critical content first.

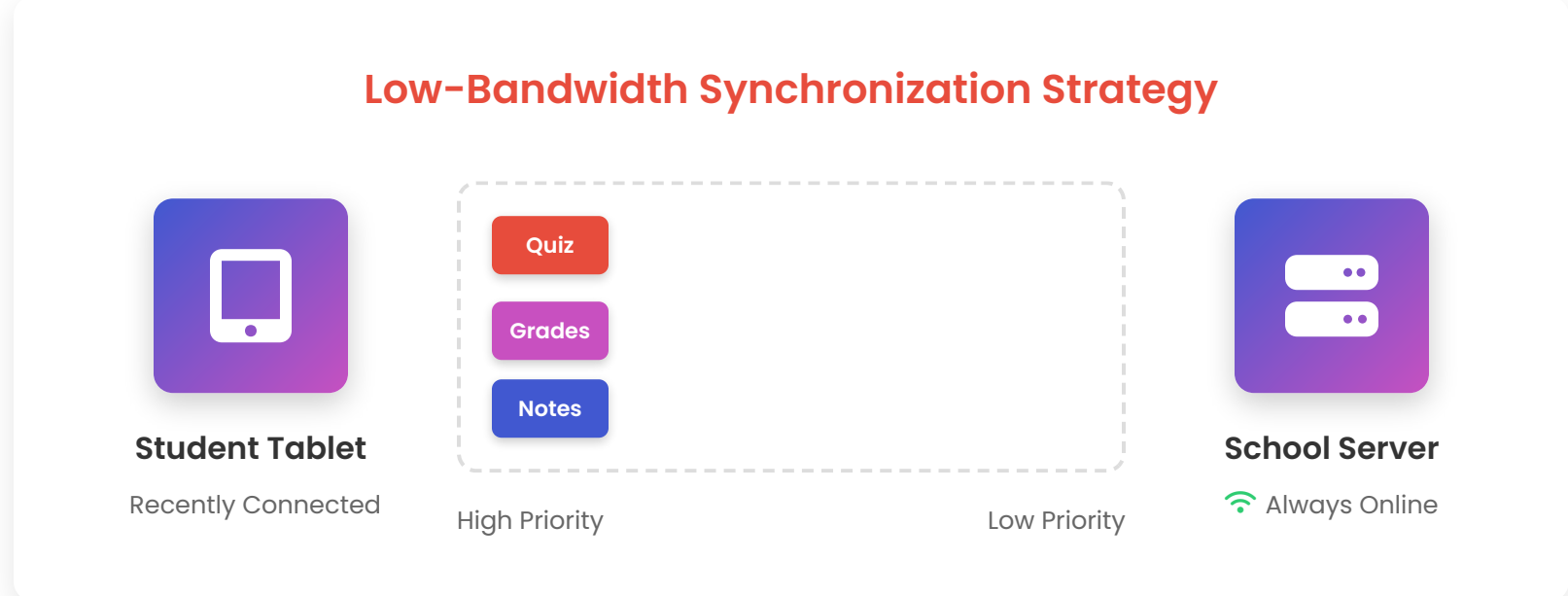


"Our platform intelligently manages data synchronization. When devices go offline, data is stored locally and synced when connectivity returns, with compression to minimize bandwidth usage."



System Architecture

Offline State Data	Online State Data
<div><div>📖</div><div>Cached Lessons</div><div>Stored</div></div>	<div><div>📖</div><div>Cached Lessons</div><div>Synced</div></div>
<div><div>📝</div><div>Completed Assignments</div><div>Pending Sync</div></div>	<div><div>📝</div><div>Completed Assignments</div><div>Uploaded</div></div>
<div><div>📊</div><div>Progress Metrics</div><div>Pending Sync</div></div>	<div><div>📊</div><div>Progress Metrics</div><div>Updated</div></div>
<div><div>🕒</div><div>Study Time Log</div><div>Stored</div></div>	<div><div>🕒</div><div>Study Time Log</div><div>Synced</div></div>
<div><div>📝</div><div>Draft Notes</div><div>Stored</div></div>	<div><div>📝</div><div>Draft Notes</div><div>Backed Up</div></div>



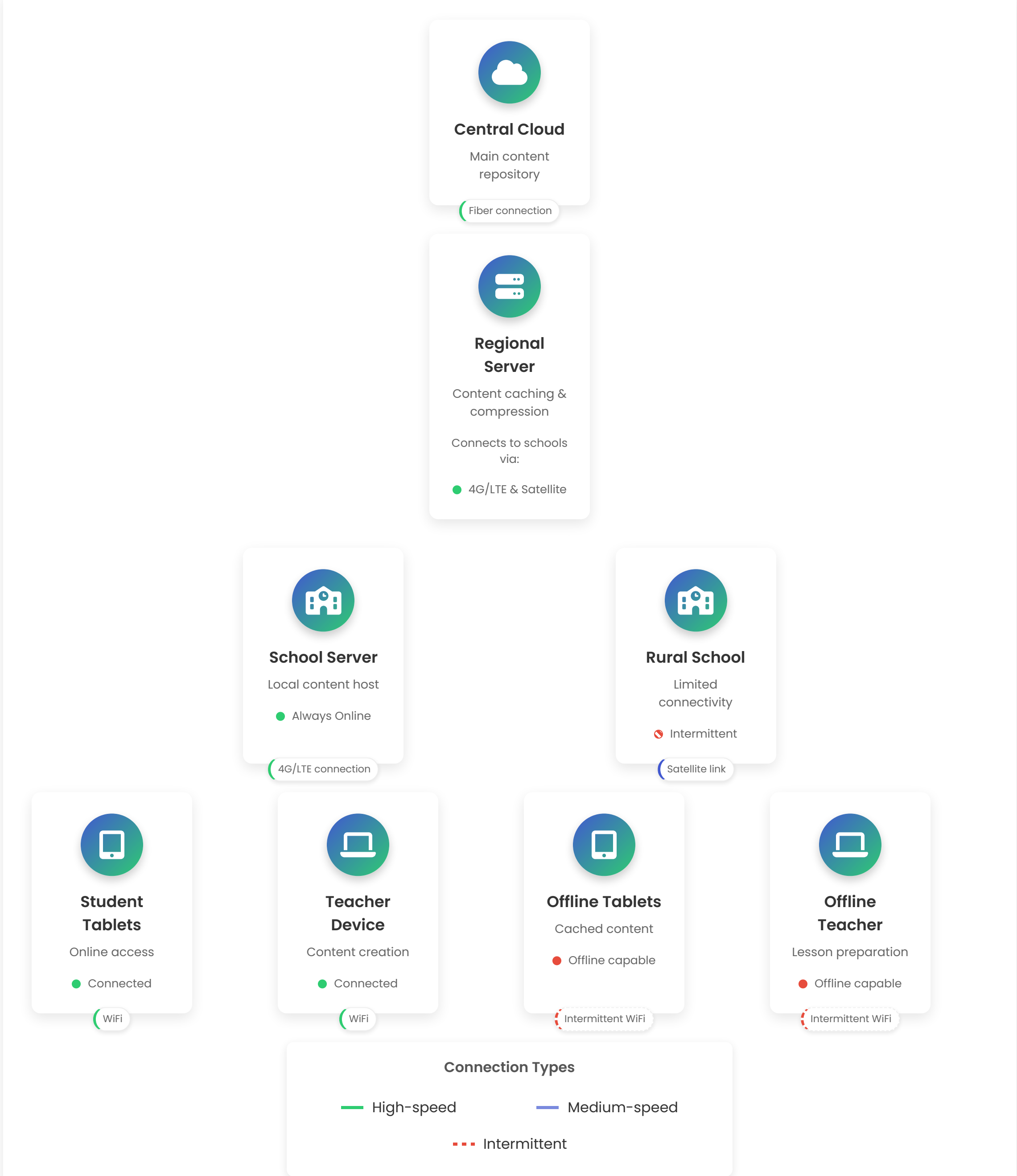
"When I connect to the school WiFi, my app automatically prioritizes sending completed assignments first, then syncs new content to study later. The system compresses data to save bandwidth."



Thabo, Student

## Infrastructure Diagrams

Our infrastructure is designed to provide educational content in low-bandwidth environments. The system utilizes a distributed approach with local caching servers, offline-first applications, and adaptive content delivery.



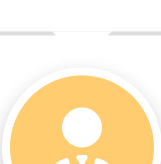
"Our infrastructure is designed to work in rural areas with limited connectivity. Each school has a local server that caches content and can operate independently when internet is unavailable."



Infrastructure Design

Local Data Storage	Low-Bandwidth Optimization	Intelligent Synchronization
Robust offline-first architecture with local databases that enable full functionality without internet connection. <ul style="list-style-type: none"><li>✓ Uses IndexedDB for browser storage</li><li>✓ SQLite for mobile applications</li><li>✓ Automatic data versioning</li></ul>	Intelligent compression and content delivery mechanisms designed specifically for constrained network environments. <ul style="list-style-type: none"><li>✓ Content prioritization algorithms</li><li>✓ Progressive image loading</li><li>✓ Text-first content delivery</li></ul>	Smart sync capabilities that efficiently manage data transfers when connectivity is restored after offline periods. <ul style="list-style-type: none"><li>✓ Conflict resolution strategies</li><li>✓ Delta updates only</li><li>✓ Background synchronization</li></ul>

"As a school administrator in a rural area, I've seen how this system keeps working during our frequent power and internet outages. Teachers can prepare lessons offline, and students never lose access to learning materials."



Mr. Ndlovu, Principal