TECHNICAL DOCUMENTATION

NHWP Data Collection System

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React · Node.js · Express · MongoDB · Recharts · SheetJS · Render

30	37	12 + 4	4
cadres across 13 boards	States and the FCT, 774 LGAs	guided sections: bodies and states	kinds of login

> This system serves government regulatory bodies. No credentials, links or submitted data are shown here. A live walkthrough is available on request.

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01 THE STORY BEHIND THE PROJECT

> *Imagine thirteen councils each emailing the ministry a spreadsheet. Someone downloads them, opens each one, copies the numbers into a master file, and finds that two disagree. They write back. The councils reply with a new spreadsheet. A month passes.*
>
> *The system is the end of that email chain. Each council logs in, fills a guided form, and the ministry reviews the submission before it counts.*

Every year the regulatory bodies send the Federal Ministry of Health a count of the health workers they register, and every state office reports recruitment, retirement, death in service and resignation. They used to do it in offline Excel templates, including one I built earlier. Templates were emailed back and forth, edited by hand and merged by hand, and errors surfaced late.

The brief was to move collection online, make each submission traceable to the body that sent it, check it before it counted, and feed the national analysis and dashboards directly.

02 MY ROLE

- Built the system end to end: the data model, the server, the forms, the review workflow and the dashboards.
- Carried over the institution lists from the first version, a Google Apps Script web app on Google Sheets.
- Wrote the technical white papers, presentations and pipeline diagrams that describe it.
- Prepared the system so the ministry can maintain it.

03 WORDS USED IN THIS DOCUMENT

Word	What it means
Regulatory body	A statutory council or board that registers and licenses one or more cadres.
Cadre	A type of health worker. The system holds 30, grouped under 13 boards.
Owner	Whoever fills a section: a regulatory body or a state office.
Section	One guided part of the form, for example Registered and Licensed, or Retirement.
Submission	One saved section for one owner and one year. It moves from draft to pending to approved or returned.
Review queue	The list of submissions waiting for an administrator's decision.
LGA	Local Government Area, the level below the state.
Density	Health workers per 10,000 people, the usual way of comparing places of different size.

04 HOW THE SYSTEM GREW

The first version was a Google Apps Script web app with Google Sheets behind it. It was rebuilt as a full web application so that it could carry more users, more rules and a public dashboard.

Part	First version	Rebuilt version
Front end	Apps Script HTML pages	React single-page app, Recharts for charts
Server	Apps Script	Node.js with Express
Storage	Google Sheets	MongoDB through Mongoose
Sign-in	Sheet-based codes	Hashed passcodes and signed tokens
Hosting	Google	Render, one web service that serves the app and the API

05 WHO CAN DO WHAT

There are four kinds of login. Each has its own code, for example MDCN-MD for medical doctors, LAGOS for a state office, or ADMIN.

Role	Fills in	Can see	Can do
Regulatory body (30 cadre logins)	Twelve guided sections; doctors and nurses fill one more for specialists	Their own submissions	Save drafts, submit, request a reopen of an approved section
State office (37 states and the FCT)	Four sections: recruitment, retirement, death and resignation	Their own submissions	The same
Administrator	Nothing	Every submission and the coverage view	Approve, return with a reason, bulk approve, decide reopen requests, manage passcodes and the public landing page
National desk	Country-level indicator pages	Dashboards	Edit the national pages

Passcodes are hashed with bcrypt. A sign-in returns a signed token that expires after 12 hours, and every route checks the role before it does anything.

06 HOW A SUBMISSION MOVES

DRAFT	PENDING	APPROVED	RETURNED
Owner saves a section; figures survive a browser reload	Owner submits; it joins the review queue	Administrator approves; the section locks	Administrator returns it with a reason the owner reads

1. Each section is saved as one document, unique for the owner, the year and the section. Saving the same section again replaces it, so there is never a second copy.
2. When the owner submits, the status changes from draft to pending.
3. The administrator approves or returns it. A return must carry a reason, up to 600 characters, or the system refuses it.
4. An approved section is locked. If it needs changing, the owner asks for it to be reopened and gives a reason, and the administrator decides.
5. The owner gets an email saying the section was approved or returned. The email is sent after the review is saved, so a mail outage can never make the review itself look as though it failed.
6. Only approved data reaches the dashboards.

07 HOW THE DATA IS CHECKED

One set of validation rules covers the forms, the Excel template and uploads, so a figure that fails in one place fails in all of them.

- State and LGA pickers hold all 37 states and the FCT and all 774 LGAs, so nobody types a state name wrongly.
- Long lists page through, so a council with hundreds of rows is not lost in one scroll.
- A coverage view shows which bodies and states have sent which sections, so the administrator can chase the ones that have not.
- Bulk approval approves everything one owner has sent in a single action.

08 HOW THE NUMBERS BECOME DASHBOARDS

Dashboards run on approved data only. They show the workforce by cadre, state and year, in six views: overview, distribution, education, deployment, attrition and financing.

THE CALCULATION BEHIND THE DENSITY PAGES

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density  =  licensed workers  ÷  state population  ×  10,000
WHO benchmark:  4.45 doctors, nurses and midwives per 1,000 people   (SDG 3.c)
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State populations are held as a fixed lookup, taken from the National Population Commission's projections. They are used only to turn counts into densities, never as workforce data. A table of global averages by cadre group gives each density a benchmark and a worker gap, and a cadre with no published global standard shows its density with no gap.

A public landing page shows an open version, with a drill-down map by state. Its content is editable by the administrator.

09 WHAT THE SYSTEM INCLUDES

Part	What it does
Sign-in and roles	Four roles, hashed passcodes, signed tokens, passcode changes and administrator resets.
Section forms	Twelve body sections, four state sections, and the specialist section for doctors and nurses.
Review queue	Approve, return with reason, bulk approve, reopen requests.
Coverage view	Who has sent what, by body and by state.
Email notices	Sent through an email service over HTTPS, so it works on the hosting platform. Skipped cleanly if no key is set, and the screen says so.
Excel import and export	A template with the same rules as the forms, and exports of approved data.
Dashboards and public page	Six internal views and an open version with a state map.
Demo data	A seed script that fills the database with fictional submissions so the system can be shown without real data.

10 DOCUMENTATION DELIVERED

Technical white papers, presentations and pipeline diagrams describing the architecture, the review workflow and the analytics stack, so the ministry can maintain the system.

11 WHAT CHANGED

Every submission is reviewed before it is counted, and the national analysis and dashboards run only on approved data instead of hand-merged spreadsheets. Each figure can be traced to the body that sent it and to the administrator's decision on it.

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