Deployment Guide

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1. System Requirements

1.1 Required Software and Versions

- **Node.js:** Version 20.11.x (tested with 20.11.1)
- **npm:** Version 10.x (bundled with Node.js 20)
- **MongoDB:** Version 6.0 or later (Atlas, replica set, or standalone)
- **Git:** Version 2.40 or later
- **Bash shell:** Any POSIX-compliant shell (for `build.sh` and `publish.sh`; Windows users can use Git Bash or WSL)

1.2 Operating System Requirements

- **Supported OS:** Windows 10+, Windows Server 2019+, macOS 12+, Ubuntu 20.04+, Debian 12+
- **Architecture:** x64

1.3 Hardware Recommendations

- **CPU:** Minimum 2 vCPUs (4 recommended for production)
- **RAM:** Minimum 4 GB (8 GB recommended when all services run on one host)
- **Disk Space:** 10 GB free for code, dependencies, and logs (plus MongoDB storage)
- **Network:** Stable outbound access to MongoDB; inbound firewall rules allowing ports 3000, 3001, and 8080

2. Installation Steps

2.1 Clone Repositories

```
git clone https://github.com/24-S1-2-C-Moral-Decisions/moral-back-end.git
git clone https://github.com/24-S1-2-C-Moral-Decisions/moral-front-end.git
git clone https://github.com/24-S1-2-C-Moral-Decisions/moral-survey.git
```

Set a deployment root for convenience (update the path as needed):

```
export DEPLOY_ROOT=/path/to/moral-decisions
mkdir -p "$DEPLOY_ROOT"
mv moral-back-end moral-front-end moral-survey "$DEPLOY_ROOT"/
```

Project structure:

```
$DEPLOY_ROOT/
├── moral-back-end/
├── moral-front-end/
└── moral-survey/
```

2.2 Backend (`moral-back-end`)

- **Install dependencies**

  ```
  cd "$DEPLOY_ROOT/moral-back-end"
  npm install
  ```

- **Configure environment variables**
  Create `moral-back-end/.env/.env.production`:

  ```
  cat > "$DEPLOY_ROOT/moral-back-end/.env/.env.production" <<'EOF'
  PORT=3001
  DATABASE_URL=mongodb://<your-mongo-host>:27017
  TFIDF_WORKER_NUM=4
  TFIDF_WORKER_BATCH_SIZE=500
  DEFAULT_CACHE_TTL=3600
  NODE_ENV=production
  EOF
  ```

  Replace `<your-mongo-host>` with the actual MongoDB connection string.
- **Build**

  ```
  npm run build
  ```

2.3 Frontend (`moral-front-end`)

- **Install dependencies**

  ```
  cd "$DEPLOY_ROOT/moral-front-end"
  npm install
  ```

- **Configure environment variables**
  Create `moral-front-end/.env.local`:

  ```
  cat > "$DEPLOY_ROOT/moral-front-end/.env.local" <<'EOF'
  NEXT_PUBLIC_API_URL="http://115.146.86.210:3001/"
  NEXT_PUBLIC_SURVEY_URL="http://115.146.86.210:8080/"
  EOF
  ```

- **Build**

  ```
  npm run build
  ```

2.4 Survey (`moral-survey`)

- **Prepare scripts (first run)**

  ```
  cd "$DEPLOY_ROOT/moral-survey/src"
  chmod +x build.sh publish.sh
  ```

- **Build static files**

  ```
  ./build.sh
  ./publish.sh
  ```

  Output is placed in `$DEPLOY_ROOT/moral-survey/src/build`.

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3. Running the Application

3.1 Start Backend

```
cd "$DEPLOY_ROOT/moral-back-end"
NODE_ENV=production PORT=3001 npm run start:prod
```

Expected console output includes:

```
Nest application successfully started
Listening on port 3001
Connected to MongoDB
```

3.2 Start Frontend

```
cd "$DEPLOY_ROOT/moral-front-end"
HOST=0.0.0.0 PORT=3000 npm run start
```

Expected output:

```
Ready on http://0.0.0.0:3000
Compiled successfully
```

3.3 Serve Survey

```
cd "$DEPLOY_ROOT/moral-survey/src/build"
npx serve -l tcp://0.0.0.0:8080 .
```

Keep the terminal session running (or manage the process with `pm2`, `systemd`, etc.).

3.4 Access Points

- Frontend: http://115.146.86.210:3000/
- Backend API: http://115.146.86.210:3001/
- Survey site: http://115.146.86.210:8080/
- API health check (example): http://115.146.86.210:3001/health

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4. Common Issues

4.1 Application Not Starting

- **Symptom:** `npm run start` exits immediately or reports missing modules.
- **Fix:** Verify Node.js version (`node -v`), run `npm install`, then rebuild (`npm run build`) before restarting.

4.2 Port Conflicts

- **Symptom:** `Error: listen EADDRINUSE` on ports 3000, 3001, or 8080.
- **Fix:** Identify conflicting processes (`sudo lsof -i :3001`) and stop them, or override ports when starting (`PORT=3100 npm run start:prod`).

4.3 Database Connection Issues

- **Symptom:** `MongoServerSelectionError` when starting the backend.
- **Fix:** Confirm the MongoDB host is reachable using `mongosh`, check firewall rules, and ensure the `DATABASE_URL` in `.env.production` is correct.

4.4 Dependency Installation Errors

- **Symptom:** `npm install` fails with permission or checksum errors.
- **Fix:** Clear the npm cache (`npm cache clean --force`), delete `node_modules` and lockfiles, then reinstall.

4.5 Environment Variable Issues

- **Symptom:** Frontend cannot reach backend or survey.
- **Fix:** Review `.env/.env.production`, `.env.local`, and survey config; restart each service after changes.

4.6 Survey Build Problems

- **Symptom:** `build.sh` or `publish.sh` fails.
- **Fix:** Ensure Node.js 20 is installed, rerun `npm install` within each `moral-survey/src/moral-survey-*` folder if the script reports missing packages.

Quality Checklist

- ☑️ Clear step-by-step instructions
- ☑️ All commands provided and tested
- ☑️ Easy to follow for new deployers
- ☑️ Common issues covered
- ☑️ All sections complete
- ☑️ Reviewed by team