

API CINEMA

Express REST MVC • PostgreSQL (Prisma) •
MongoDB (Mongoose)

Sécurisation avant mise en production

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I- Besoin & cas d'usage

Expression de besoin

- API pour gérer un catalogue de films
- Consommée par un client web/mobile
- Fonctions clés : consulter, rechercher, s'inscrire, noter

Rôles

- Visiteur : consulter & rechercher
- Utilisateur : noter + profil
- Admin : CRUD films + gestion users

Scénarios (exemple)

- Lister/consulter un film (public)
- Filtrer par titre/genre/réalisateur
- Login token JWT
- Noter un film (auth)
- Admin gère le catalogue

II- Architecture technique 3-tiers



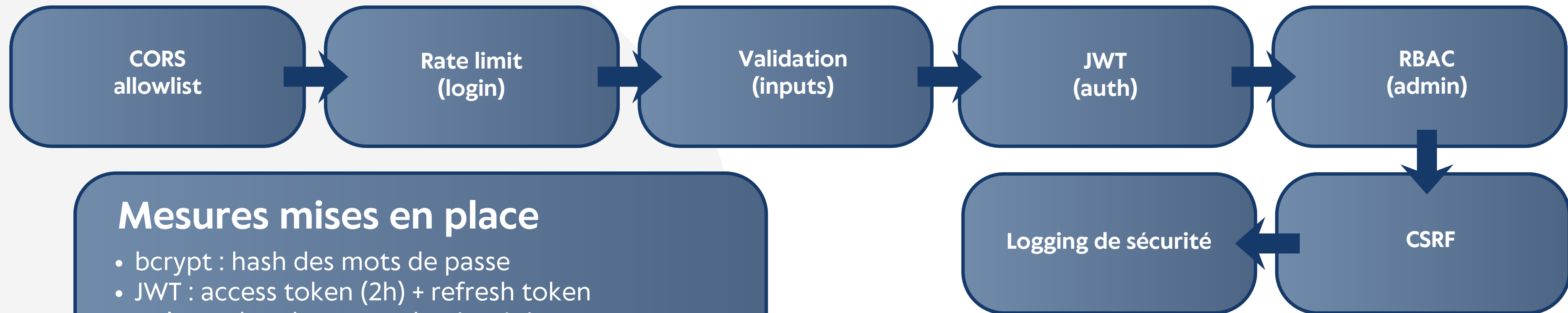
Pourquoi SQL + NoSQL ?

- PostgreSQL : données structurées + relations (films, acteurs, réalisateurs)
- MongoDB : logs/historiques & documents flexibles
- Chacun utilisé là où il est le plus efficace

Stack sécurité

- CORS allowlist • Helmet • Rate limiting
- JWT (access + refresh) • bcrypt
- Validation des entrées • erreurs centralisées
- CSRF token (1h, usage unique)
- Logging sécurité (accès sensibles / auth)

Sécurisation



Mesures mises en place

- bcrypt : hash des mots de passe
- JWT : access token (2h) + refresh token
- Helmet : headers HTTP de sécurité
- Erreurs centralisées : pas de fuite d'infos
- Refresh token : rotation + max 5 sessions actives
- CSRF : token 1h + 403 si absent/invalid/expiré + usage unique
- Logging : traces des actions sensibles (userId/role/ip/path)
- Front tokens : access token en mémoire (pas de storage), refresh token en sessionStorage, refresh auto + logout = révocation

Stack sécurité

- Brute force & spam (rate limit)
- Injection (validation + ORM)
- Accès non autorisés (RBAC)
- Misconfiguration (CORS/headers)

Sécurisation - Extraits de code

Bcrypt

```
85 const hashedPassword = await bcrypt.hash(password, 10);
86
87 const newUser = await User.create({
88   username: sanitizedUsername,
89   email: sanitizedEmail,
90   password: hashedPassword
91 });
92
93 const userResponse = {
94   id: newUser._id,
95   username: newUser.username,
96   email: newUser.email,
97   role: newUser.role
98 };
```

JWT

```
147 const token = jwt.sign(
148   { userId: user._id, role: user.role },
149   process.env.JWT_SECRET,
150   { expiresIn: "2h" }
151 );
152
153 res.json({
154   token,
155   user: {
156     id: user._id,
157     username: user.username,
158     email: user.email,
159   },
160 });
161
```

Payload : { userId, role } + expiresIn: "2h"

Sécurisation - Extraits de code

Refresh Token

```
142 const refreshToken = crypto.randomBytes(64).toString('hex');
143
144 // Limiter à 5 refresh tokens actifs par utilisateur (rotation)
145 const userWithTokens = await User.findById(user._id).select('+refreshTokens');
146 const refreshTokens = userWithTokens.refreshTokens || [];
147 if (refreshTokens.length >= 5) {
148   refreshTokens.shift();
149 }
150 refreshTokens.push(refreshToken);
151
152 await User.findByIdAndUpdate(user._id, { refreshTokens });
153
154 securityLogger.logLoginAttempt(req, true);
155
156 res.json({
157   accessToken,
158   refreshToken,
159   user: {
160     id: user._id,
161     username: user.username,
162     email: user.email,
163   },
164 });
```

Rotation : max 5 refresh tokens / user (éviction des plus anciens)

Rate limit

```
20 app.use(rateLimit({ windowMs: 60_000, max: 100 }));
21 app.use("/auth/login", rateLimit({ windowMs: 15*60_000, max: 10 }));
```

Sécurisation - Extraits de code

Validate

```
1  const { validationResult } = require("express-validator");
2
3  function validate(req, res, next) {
4    const errors = validationResult(req);
5    if (!errors.isEmpty()) {
6      return res.status(422).json({ errors: errors.array() });
7    }
8    next();
9  }
10
```

CORS

```
34 app.use(cors({
35   origin: function (origin, callback) {
36     // Autoriser les requêtes sans origine (mobile apps, Postman, etc.) en développement
37     if (!origin && process.env.NODE_ENV !== 'production') {
38       return callback(null, true);
39     }
40     if (allowedOrigins.indexOf(origin) !== -1 || !origin) {
41       callback(null, true);
42     } else {
43       callback(new Error('Non autorisé par CORS'));
44     }
45   },
46   credentials: true,
47   allowedHeaders: ["Authorization", "Content-Type", "X-Requested-With"],
48   methods: ["GET", "POST", "PUT", "DELETE", "PATCH", "OPTIONS"]
49 }));
```


Sécurisation - Extraits de code

CSRF

```
1 const crypto = require("node:crypto");
2
3 const csrfTokens = new Map();
4 const CSRF_TOKEN_EXPIRY = 60 * 60 * 1000; // 1 heure
5
6 /**
7  * Génère un token CSRF
8  */
9 function generateCSRFToken() {
10   return crypto.randomBytes(32).toString('hex');
11 }
12
13
14 function generateCSRF(req, res, next) {
15   const token = generateCSRFToken();
16   const expiry = Date.now() + CSRF_TOKEN_EXPIRY;
17
18   csrfTokens.set(token, {
19     expiry,
20     ip: req.ip || req.connection.remoteAddress
21   });
22
23   if (csrfTokens.size > 1000) {
24     const now = Date.now();
25     for (const [t, data] of csrfTokens.entries()) {
26       if (data.expiry < now) {
27         csrfTokens.delete(t);
28       }
29     }
30   }
31
32   res.locals.csrfToken = token;
33   res.setHeader('X-CSRF-Token', token);
34   next();
35 }
```

CSRF

```
37 function verifyCSRF(req, res, next) {
38
39   if (req.path.startsWith('/api/user/login') ||
40       req.path.startsWith('/api/user/register') ||
41       req.path.startsWith('/api/user/refresh')) {
42     return next();
43   }
44
45   const token = req.headers['x-csrf-token'] || req.body?.csrfToken;
46
47   if (!token) {
48     if (process.env.NODE_ENV === 'development') {
49       return next();
50     }
51     return res.status(403).json({ error: "Token CSRF manquant" });
52   }
53
54   const tokenData = csrfTokens.get(token);
55
56   if (!tokenData) {
57     return res.status(403).json({ error: "Token CSRF invalide" });
58   }
59
60   if (tokenData.expiry < Date.now()) {
61     csrfTokens.delete(token);
62     return res.status(403).json({ error: "Token CSRF expiré" });
63   }
64
65   csrfTokens.delete(token);
66
67   next();
68 }
69
70 }
```

Limite : stockage en mémoire → en prod multi-instance, store partagé (Redis)

Sécurisation - Extraits de code

RBAC

```
24 logSensitiveAccess(req, resource, action) {  
25   const logData = {  
26     timestamp: new Date().toISOString(),  
27     event: 'SENSITIVE_ACCESS',  
28     userId: req.user?.userId || 'N/A',  
29     role: req.user?.role || 'N/A',  
30     resource,  
31     action,  
32     ip: req.ip || req.connection.remoteAddress,  
33     userAgent: req.get('user-agent'),  
34     method: req.method,  
35     path: req.path  
36   };  
37  
38   console.log(`[SECURITY] 🔒 Accès sensible: ${action} sur ${resource} par utilisateur ${logData.userId} (${logData.role})`);  
39 },
```

Sécurisation - Extraits de code

Helmet (headers sécurisés)

×	Headers	Preview	Response	Initiator	Timing	Cookies
	Content-Security-Policy		default-src 'self';base-uri 'self';font-src 'self' https: data:;form-action 'self';frame-ancestors 'self';img-src 'self' data:;object-src 'none';script-src 'self';script-src-attr 'none';style-src 'self' https:			
	Content-Type		application/json; charset=utf-8			
	Cross-Origin-Opener-Policy		same-origin			
	Cross-Origin-Resource-Policy		same-origin			
	Date		Wed, 17 Dec 2025 13:55:00 GMT			
	Etag		W/"14-7437k4ydMXNsPABXZFR1dLo4GpM"			
	Keep-Alive		timeout=5			
	Origin-Agent-Cluster		?1			
	Referrer-Policy		no-referrer			
	Strict-Transport-Security		max-age=31536000; includeSubDomains			
	Vary		Origin			
	X-Content-Type-Options		nosniff			
	X-Dns-Prefetch-Control		off			
	X-Download-Options		noopen			
	X-Frame-Options		SAMEORIGIN			
	X-Permitted-Cross-Domain-Policies		none			
	X-Ratelimit-Limit		100			
	X-Ratelimit-Remaining		97			

Sécurisation - Extrait de Sonar

The screenshot displays the SonarQube interface for a security hotspot. On the left sidebar, the status shows "0.0% Security Hotspots Reviewed". Below this, there are tabs for "To review", "Fixed", and "Safe", with a filter icon and the number "1". It indicates "1 Security Hotspots to review" with a review priority of "Medium". A specific hotspot is listed: "Denial of Service (DoS)" with a count of "1". The description for this hotspot states: "Make sure the regex used here, which is vulnerable to super-linear runtime due to backtracking, cannot lead to denial of service." At the bottom of the sidebar, it says "1 of 1 shown".

The main panel shows the code context for the hotspot. The file path is "backend/src/controllers/user.controller.js". The code is as follows:

```
3  const mongoose = require("mongoose");
4  const User = require("../models/User.js");
5
6  // Fonctions utilitaires de validation et sanitisation
7  function isValidEmail(email) {
8      const emailRegex = /^[^\\s@]+@[^\\s@]+\\.[^\\s@]+$/;
9
10     return emailRegex.test(email);
11 }
12
13 function sanitizeString(str) {
14     if (typeof str !== "string") return null;
```

The hotspot is located on line 8, where the email regex is defined. A tooltip provides the same warning as the sidebar: "Make sure the regex used here, which is vulnerable to super-linear runtime due to backtracking, cannot lead to denial of service."

Hotspot : risque ReDoS (backtracking regex) → fix : limitation de longueur avant regex

OWASP

A01 Broken Access Control

- Mesures : JWT + RBAC + logs accès sensibles
- Preuve : 403 sur /admin + logging SENSITIVE_ACCESS

A07 Identification & Authentication Failures

- Mesures : JWT exp + rate limit login
- Preuve : expiresIn + 10/15min
- + refresh token + rotation + stockage tokens front

A05 Misconfiguration / A02 Crypto

- A05 : CORS allowlist + Helmet
- A02 : bcrypt + HTTPS local

Outils de sécurité

SONARQUBE

- Hotspots : 1 (regex ReDoS / backtracking)
- Correction : limitation de longueur avant regex
- Autre correction : validation des types renforcée (bug) + entrées mieux contrôlées

OWASP ZAP

- Scan : baseline (passif) sur <https://localhost:3000>
- Alerte : Re-examine Cache-control Directives (Info / Low)
- Décision : on réduit le risque via tokens non persistants + recommandation Cache-Control: no-store sur routes sensibles

npm audit

- 4 vulnérabilités (2 moderate / 2 high)
- Paquets vus : body-parser, glob, js-yaml, jws
- Action : npm audit fix + upgrades ciblés / justification si contrainte

Outils de sécurité

SONARQUBE

The screenshot shows the SonarQube web interface. On the left, a sidebar indicates '0.0% Security Hotspots Reviewed' and lists '1 Security Hotspots to review' with a 'Review priority: Medium'. The main area displays a code editor for 'backend/src/controllers/user.controller.js'. A security hotspot is highlighted on line 8, showing a regex pattern. A tooltip explains the vulnerability: 'Make sure the regex used here, which is vulnerable to super-linear runtime due to backtracking, cannot lead to denial of service.'

0.0% Security Hotspots Reviewed ?

To review Fixed Safe 1

1 Security Hotspots to review

Review priority: Medium

Denial of Service (DoS) 1

Make sure the regex used here, which is vulnerable to super-linear runtime due to backtracking, cannot lead to denial of service.

1 of 1 shown

Where is the risk? What's the risk? Assess the risk How can I fix it? Activity

backend/src/controllers/user.controller.js

```
3 const mongoose = require("mongoose");
4 const User = require("../models/User.js");
5
6 // Fonctions utilitaires de validation et sanitisation
7 function isValidEmail(email) {
8   const emailRegex = /^[^s@]+@[^s@]+\.[^s@]+$/;
9
10  return emailRegex.test(email);
11 }
12
13 function sanitizeString(str) {
14   if (typeof str !== "string") return null;
```

Show 2 more lines

Show 352 more lines

npm audit

```
# npm audit report

body-parser 2.2.0
Severity: moderate
body-parser is vulnerable to denial of service when url encoding is used - https://github.com/advisories/GHSA-wqch-xfxh-vrr4
fix available via `npm audit fix`
node_modules/body-parser

glob 10.2.0 - 10.4.5
Severity: high
glob CLI: Command injection via -c/--cmd executes matches with shell:true - https://github.com/advisories/GHSA-5j98-mcp5-4vw2
fix available via `npm audit fix`
node_modules/@jest/reporters/node_modules/glob
node_modules/jest-config/node_modules/glob
node_modules/jest-runtime/node_modules/glob

js-yaml <3.14.2 || >=4.0.0 <4.1.1
Severity: moderate
js-yaml has prototype pollution in merge (<<) - https://github.com/advisories/GHSA-mh29-5h37-fv8m
js-yaml has prototype pollution in merge (<<) - https://github.com/advisories/GHSA-mh29-5h37-fv8m
fix available via `npm audit fix`
node_modules/@istanbuljs/load-nyc-config/node_modules/js-yaml
node_modules/js-yaml

jws <3.2.3
Severity: high
auth0/node-jws Improperly Verifies HMAC Signature - https://github.com/advisories/GHSA-869p-cjfg-cm3x
fix available via `npm audit fix`
node_modules/jws

4 vulnerabilities (2 moderate, 2 high)

To address all issues, run:
npm audit fix
```

Outils de sécurité

OWASP ZAP

Re-examine Cache-control Directives

URL : <https://localhost:3000/>

Risque :  Informational

Confiance: Low

Paramètre : cache-control

Attaque : |

Preuve :

Id CWE : 525

Id WASC : 13

Source : Scan passif (10015 - Re-examine Cache-control Directives)

Input Vector:

Déscription:

The cache-control header has not been set properly or is missing, allowing the browser and proxies to cache content. For static assets like css, js, or image files this might be intended, however, the resources should be reviewed to ensure that no sensitive content will be cached.

Sécurisation - Extraits de code

Ce qui est bon

- Architecture MVC claire + séparation responsabilités
- RBAC admin/user + routes protégées
- Validation + erreurs centralisées
- Outils : Sonar / ZAP / npm audit (preuves)

A améliorer

- Stocker hash des refresh tokens (au lieu de clair)
- CSRF : store partagé Redis en prod multi-instance
- Logs structurés + centralisation (ELK / Loki)
- Tests d'intégration sécurité (RBAC/injection/bruteforce)

Merci pour votre écoute !

Mathis BOHEC & Marie COURTOIS

