Cấu trúc cơ sở dữ liệu MongoDB cho hệ thống quản lý công việc như sau:

## 1. Collection users

javascript

{ \_id: ObjectId, username: String, fullName: String, email: String, phoneNumber: String, passwordHash: String, isActive: Boolean, position: String, directManager: ObjectId, joinDate: Date, securitySettings: { loginAttempts: Number, lockUntil: Date, twoFactorEnabled: Boolean, lastLogin: Date }, roles: [{ roleId: ObjectId, assignedDate: Date, expiryDate: Date }], permissions: [{ code: String, module: String, assignedDate: Date }], departments: [{ departmentId: ObjectId, position: String, startDate: Date, endDate: Date, isActive: Boolean }], preferences: { notifications: { inApp: Boolean, email: Boolean, sms: Boolean, categories: Object, quietHours: Object }, dashboard: Object }, metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 2. Collection roles

javascript

{ \_id: ObjectId, name: String, description: String, permissions: [{ code: String, module: String, actions: [String] }], isSystem: Boolean, metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 3. Collection departments

javascript

{ \_id: ObjectId, name: String, code: String, description: String, parentDepartment: ObjectId, manager: { userId: ObjectId, assignedDate: Date }, foundingDate: Date, displayOrder: Number, isActive: Boolean, path: String, history: [{ event: String, previousValue: Mixed, newValue: Mixed, date: Date, userId: ObjectId }], metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 4. Collection tasks

javascript

{ \_id: ObjectId, title: String, description: String, objective: String, managingDepartment: ObjectId, priority: String, status: String, categories: [ObjectId], startDate: Date, dueDate: Date, deadlineType: String, completedDate: Date, progressPercentage: Number, isRecurring: Boolean, parentTask: ObjectId, assignment: { type: String, assigneeId: ObjectId, assignedBy: ObjectId, assignedDate: Date, instructions: String, status: String, responseDate: Date, responseNotes: String }, supervision: { supervisorId: ObjectId, approverId: ObjectId, requiresApproval: Boolean }, resources: [{ resourceId: ObjectId, requiredFrom: Date, requiredTo: Date }], attachments: [{ fileName: String, fileType: String, fileSize: Number, uploadDate: Date, uploadedBy: ObjectId, path: String }], progress: [{ reportDate: Date, reportedBy: ObjectId, percentage: Number, description: String, issues: String, attachments: [Object] }], subtasks: [{ title: String, description: String, assignedTo: ObjectId, startDate: Date, dueDate: Date, status: String, priority: String, progressPercentage: Number, dependsOn: [String] *// IDs của subtask khác trong mảng này* }], evaluation: { evaluatedBy: ObjectId, evaluationDate: Date, rating: String, comments: String, strengths: String, areasForImprovement: String, suggestions: String, groupEvaluations: [Object] }, extensionRequests: [{ requestedBy: ObjectId, requestDate: Date, requestedDueDate: Date, reason: String, status: String, approvedBy: ObjectId, approvalDate: Date }], recurringSettings: { frequency: String, interval: Number, daysOfWeek: [Number], dayOfMonth: Number, endDate: Date, occurrences: Number, templateId: ObjectId }, history: [{ fieldChanged: String, oldValue: Mixed, newValue: Mixed, changedBy: ObjectId, changeDate: Date, reason: String }], metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 5. Collection taskCategories

javascript

{ \_id: ObjectId, name: String, description: String, parentCategory: ObjectId, color: String, displayOrder: Number, path: String, metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 6. Collection resources

javascript

{ \_id: ObjectId, name: String, code: String, type: String, location: String, manager: ObjectId, status: String, rules: String, specifications: String, details: { *// Fields specific to resource type* *// For rooms* capacity: Number, building: String, floor: String, roomNumber: String, equipment: [String], *// For equipment* model: String, serialNumber: String, manufacturer: String, purchaseDate: Date, warrantyExpiration: Date, *// For software* version: String, developer: String, licenseType: String, licenseCount: Number, expirationDate: Date, systemRequirements: String }, maintenanceHistory: [{ date: Date, type: String, performedBy: ObjectId, description: String, nextScheduled: Date }], bookings: [{ startTime: Date, endTime: Date, requestedBy: ObjectId, purpose: String, status: String, approvedBy: ObjectId, approvalDate: Date }], images: [{ fileName: String, path: String, uploadDate: Date }], metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 7. Collection groups

javascript

{ \_id: ObjectId, name: String, code: String, description: String, type: String, managingDepartment: ObjectId, startDate: Date, endDate: Date, structure: String, workingRules: String, status: String, members: [{ userId: ObjectId, role: String, responsibilities: String, joinDate: Date, endDate: Date, status: String, invitedBy: ObjectId }], tasks: [ObjectId], *// References to tasks assigned to this group* evaluations: [{ evaluationType: String, period: { start: Date, end: Date }, evaluatedBy: ObjectId, date: Date, criteria: [Object], comments: String, strengths: String, improvementAreas: String }], metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 8. Collection documents

javascript

{ \_id: ObjectId, title: String, description: String, type: String, tags: [String], owner: ObjectId, access: { type: String, entityId: ObjectId, rights: [{ entityType: String, entityId: ObjectId, permissionLevel: String }] }, file: { fileName: String, fileType: String, fileSize: Number, path: String, uploadDate: Date, version: Number }, versionHistory: [{ version: Number, updatedBy: ObjectId, updateDate: Date, changes: String, path: String }], relatedEntity: { type: String, id: ObjectId }, metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 9. Collection notifications

javascript

{ \_id: ObjectId, receiverId: ObjectId, type: String, subtype: String, title: String, content: String, priority: String, relatedEntity: { type: String, id: ObjectId }, actionUrl: String, isRead: Boolean, readAt: Date, expiresAt: Date, metadata: { createdAt: Date }}

## 10. Collection reports

javascript

{ \_id: ObjectId, name: String, description: String, type: String, parameters: { timeRange: { start: Date, end: Date }, entities: [{ type: String, id: ObjectId }], filters: Object, metrics: [String] }, displaySettings: { format: String, options: Object }, schedule: { isScheduled: Boolean, frequency: String, dayOfWeek: Number, dayOfMonth: Number, time: String, recipients: [ObjectId], lastRun: Date, nextRun: Date }, data: { generatedAt: Date, content: Object, snapshot: Boolean *// If true, this contains a snapshot of data* }, sharing: [{ entityType: String, entityId: ObjectId, permissionLevel: String }], metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 11. Collection recurringTaskTemplates

javascript

{ \_id: ObjectId, title: String, description: String, objective: String, priority: String, categories: [ObjectId], assignment: { type: String, assigneeId: ObjectId, instructions: String }, supervision: { supervisorId: ObjectId, approverId: ObjectId, requiresApproval: Boolean }, pattern: { frequency: String, interval: Number, daysOfWeek: [Number], dayOfMonth: Number, startDate: Date, endDate: Date, occurrences: Number }, instances: [ObjectId], *// References to generated tasks* nextOccurrence: Date, metadata: { createdAt: Date, updatedAt: Date, createdBy: ObjectId }}

## 12. Collection system

javascript

{ \_id: ObjectId, configType: String, *// Loại cấu hình* category: String, *// Phân loại*  settings: Object, *// Nội dung cấu hình* isActive: Boolean, metadata: { createdAt: Date, updatedAt: Date, updatedBy: ObjectId }}

## Indexes cần thiết

javascript

*// users collection*db.users.createIndex({ "username": 1 }, { unique: true })db.users.createIndex({ "email": 1 }, { unique: true })db.users.createIndex({ "roles.roleId": 1 })db.users.createIndex({ "departments.departmentId": 1 })*// departments collection*db.departments.createIndex({ "parentDepartment": 1 })db.departments.createIndex({ "path": 1 })db.departments.createIndex({ "code": 1 }, { unique: true })db.departments.createIndex({ "manager.userId": 1 })*// tasks collection*db.tasks.createIndex({ "title": "text", "description": "text" })db.tasks.createIndex({ "status": 1 })db.tasks.createIndex({ "dueDate": 1 })db.tasks.createIndex({ "assignment.assigneeId": 1 })db.tasks.createIndex({ "supervision.supervisorId": 1 })db.tasks.createIndex({ "managingDepartment": 1 })db.tasks.createIndex({ "categories": 1 })db.tasks.createIndex({ "parentTask": 1 })*// taskCategories collection*db.taskCategories.createIndex({ "parentCategory": 1 })db.taskCategories.createIndex({ "path": 1 })*// resources collection*db.resources.createIndex({ "name": "text", "code": "text" })db.resources.createIndex({ "type": 1 })db.resources.createIndex({ "status": 1 })db.resources.createIndex({ "bookings.startTime": 1, "bookings.endTime": 1 })*// groups collection*db.groups.createIndex({ "name": "text", "description": "text" })db.groups.createIndex({ "members.userId": 1 })db.groups.createIndex({ "managingDepartment": 1 })db.groups.createIndex({ "tasks": 1 })*// documents collection*db.documents.createIndex({ "title": "text", "description": "text", "tags": "text" })db.documents.createIndex({ "relatedEntity.type": 1, "relatedEntity.id": 1 })db.documents.createIndex({ "owner": 1 })*// notifications collection*db.notifications.createIndex({ "receiverId": 1 })db.notifications.createIndex({ "receiverId": 1, "isRead": 1 })db.notifications.createIndex({ "createdAt": 1 }, { expireAfterSeconds: 7776000 }) *// Tự động xóa sau 90 ngày// reports collection*db.reports.createIndex({ "metadata.createdBy": 1 })db.reports.createIndex({ "schedule.isScheduled": 1, "schedule.nextRun": 1 })