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1 DATABASE SCHEMA & ERD DOCUMENTATION

1.1 Database Overview

Database Name: koperasi

Engine: MySQL 8.0+ / MariaDB 10.6+

Charset: utf8mb4 (Unicode support)

Collation: utf8mb4_unicode_ci

Total Tables: ~65 tables

Normalization Level: 3NF (Third Normal Form)

1.2 Database Architecture

DATABASE LAYER ARCHITECTURE

MASTER DATA	TRANSACTIONAL DATA	SYSTEM DATA
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1 DOKUMENTASI SKEMA DATABASE & ERD

1.1 Ikhtisar Database

Nama Database: koperasi

Mesin: MySQL 8.0+ / MariaDB 10.6+

Charset: utf8mb4 (dukungan Unicode)

Kolasi: utf8mb4_unicode_ciTotal Tabel:

~65 tabel

Tingkat Normalisasi: 3NF (Bentuk Normal Ketiga)

1.2 Arsitektur Database

ARSITEKTUR LAPISAN DATABASE



RELATIONAL INTEGRITY ENGINE
(Foreign Keys, Constraints, Triggers)

1.3 COMPLETE ENTITY RELATIONSHIP DIAGRAM (ERD)

1.3.1 MODULE 1: USER & MEMBERSHIP

USERS TABLE

```
id          BIGINT UNSIGNED (PK)
name        VARCHAR(255)
email       VARCHAR(255) UNIQUE
password    VARCHAR(255)
role        ENUM('admin','pengurus',
                 'manager_toko','anggota')
email_verified_at  TIMESTAMP NULL
remember_token  VARCHAR(100)
created_at, updated_at TIMESTAMP
```

1:1

MEMBERS TABLE

```
id          BIGINT UNSIGNED (PK)
user_id     BIGINT UNSIGNED (FK) UNIQUE      → users.id
member_id   VARCHAR(20) UNIQUE              → A-0001, A-0002
employee_id VARCHAR(20) UNIQUE              → NIK
phone       VARCHAR(20)
address     TEXT
department_id BIGINT UNSIGNED (FK)          → departments.id
position_id  BIGINT UNSIGNED (FK)          → positions.id
join_date   DATE
status      ENUM('pending','active',
                 'inactive')
credit_limit DECIMAL(15,2) DEFAULT 0
credit_used  DECIMAL(15,2) DEFAULT 0
points      INT DEFAULT 0
photo        VARCHAR(255)
created_at, updated_at TIMESTAMP
```

MESIN INTEGRITAS RELASIONAL
(Kunci Asing, Pembatasan, Pemicu)

1.3 DIAGRAM HUBUNGAN ENTITAS LENGKAP (ERD)

1.3.1 MODUL 1: PENGGUNA & KEANGGOTAAN

TABEL PENGGUNA

id	BIGINT UNSIGNED (PK)
nama	VARCHAR(255)
email	VARCHAR(255) UNIK
kata sandi	VARCHAR(255)
peran	ENUM('admin', 'pengurus', 'manager_toko', 'anggota')
email_verified_at	TIMESTAMP NULL
remember_token	VARCHAR(100)
created_at, updated_at TIMESTAMP	

1 : 1

TABEL ANGGOTA

id	BIGINT UNSIGNED (PK)	
user_id	BIGINT UNSIGNED (FK) UNIK	→ users.id
member_id	VARCHAR(20) UNIK	→ A-0001, A-0002
employee_id	VARCHAR(20) UNIK	→ NIK
phone	VARCHAR(20)	
alamat	TEKS	
department_id	BIGINT TIDAK TANDA (FK)	→ departments.id
position_id	BIGINT TIDAK TANDA (FK)	→ positions.id
join_date	<small>TANG GAL</small>	
status	ENUM('pending', 'active', 'inactive')	
batas_kredit	DECIMAL(15,2) DEFAULT 0	
kredit_digunakan	DECIMAL(15,2)	
n_poin	DEFAULT 0 INT DEFAULT	
foto	0VARCHAR(255)	
created_at, updated_at TIMESTAMP		

N:1

N:1

DEPARTMENTS

POSITIONS

id (PK)	id (PK)
name	name
description	description
created_at	created_at

Relasi: - users → members : **1:1** (One user has exactly one member profile) - members → departments : **N:1** (Many members in one department) - members → positions : **N:1** (Many members have same position)

1.3.2 MODULE 2: FINANCE

MEMBERS

1:N

1:N

1:N

1:N

SAVINGS

LOANS

WITHDRAWAL_ REQUESTS

SHU_ DISTRIBUTIONS

id (PK)	id (PK)	id (PK)	id (PK)
member_id (FK)	member_id (FK)	member_id (FK)	member_id (FK)
trans_date	loan_number	savings_id (FK)	period_year
trans_type	amount	amount	total_savings
amount	interest_rate	status	total_trans
balance	tenor_months	approved_by (FK)	shu_savings
description	monthly_pay	approved_at	shu_trans
created_by(FK)	status	completed_by(FK)	total_shu
created_at	approved_by(FK)	completed_at	status
approved_at	notes	calculated_by(FK)	
	disbursed_at	created_at	distributed_at
	signature		created_at
	created_at		

1:N

N:1

N:1

N:1

DEPARTEMEN

JABATAN

id (PK)	id (PK)
nama	nama
deskripsi	deskripsi
dibuat_pada	dibuat_pada

Relasi: - pengguna → anggota : 1:1 (Satu pengguna memiliki tepat satu profil anggota) - anggota → departemen : N:1 (Banyak anggota dalam satu departemen) - anggota → posisi : N:1 (Banyak anggota memiliki posisi yang sama)

1.3.2 MODUL 2: KEUANGAN

ANGGOTA

1:N

1:N

1:N

1:N

TABUNGAN

TABUNGAN
PINJAMAN

PENARIKAN_
PERMINTAAN

PENARIKAN
SHU_
DISTRIBUSI

TABUNGAN	TABUNGAN PINJAMAN	PENARIKAN_ PERMINTAAN	PENARIKAN SHU_ DISTRIBUSI
id (PK)	id (PK)	id (PK)	id (PK)
id_anggota (FK)	id_anggota (FK)	id_anggota (FK)	member_id (FK)
tanggal_transaksi	nomor_pinjaman	id_tabungan (FK)	periode_tahun
i_jenis_transaksi	jumlah	jumlah	total_savings
jumlah	suku_bunga	approved_by (FK)	total_trans
saldo	tenor_bulan	approved_at	shu_savings
deskripsi	pembayaran_bulanan	diselesaikan_oleh (FK)	shu_trans
dibuat_oleh (FK)	status	completed_at	total_shu
dibuat_pada	approved_by (FK)		<small>dibuat_pada disetujui_oleh(FK) diselesaikan_pada status</small>
	approved_at	catatan	dihitung_oleh (FK)
	disbursed_at	dibuat_pada	didistribusikan_pada
	tanda_tangan		dibuat_pada
	created_at		

1:N

N:1

LOAN_PAYMENTS	SHU_SETTINGS
id (PK)	id (PK)
loan_id (FK)	period_year (UQ)
payment_number	total_shu_pool
due_date	persen_cadangan
amount	persen_jasa_modal
principal	persen_jasa_usaha
interest	pool_jasa_modal
penalty	pool_jasa_usaha
status	pool_anggota
paid_at	status
created_at	created_by (FK)
	created_at

Relasi: - members → savings : 1:N - members → loans : 1:N - loans → loan_payments : 1:N - members → withdrawal_requests : 1:N - members → shu_distributions : 1:N - shu_settings → shu_distributions : 1:N (via period_year)

1.3.3 MODULE 3: COMMERCE/MART

CATEGORIES

```

id (PK)
name
description
is_active
created_at

```

1:N

PRODUCTS

id	BIGINT UNSIGNED (PK)	
category_id	BIGINT UNSIGNED (FK)	→ categories.id
name	VARCHAR(255)	
barcode	VARCHAR(100) UNIQUE	
price	DECIMAL(15,2)	
cost	DECIMAL(15,2)	
stock	INT	
min_stock	INT DEFAULT 10	
is_preorder	BOOLEAN DEFAULT FALSE	
image	VARCHAR(255)	

PEMBAYARAN_PINJAMAN

PENGATURAN_SHU

id (PK)	id (PK)
loan_id (FK)	periode_tahun (UQ)
nomor_pembayaran	total_kolam_shu
tanggal_jatuh_tempo_jumlah_pokok	persen_cadangan
bunga	persen_jasa_modal
denda	persen_jasa_usaha
status	kolam_jasa_modal
dibayar_pada	kolam_jasa_usaha
dibuat_pada	kolam_anggota
	status
	dibuat_oleh (FK)
	dibuat_pada

Relasi: - anggota → tabungan : 1:N - anggota → pinjaman : 1:N - pinjaman → pembayaran_pinjaman : 1:N - anggota → permintaan_penarikan : 1:N - anggota → distribusi_shu : 1:N - pengaturan_shu → distribusi_shu : 1:N (via periode_tahun)

1.3.3 MODUL 3: PERDAGANGAN/PASAR

KATEGORI

id (PK)
nama
deskripsi
aktif
dibuat_pada

1:N

PRODUK

id	BIGINT UNSIGNED (PK)	
kategori_id	BIGINT UNSIGNED (FK)	→ categories.id
nama	VARCHAR(255)	
kode_barkod	VARCHAR(100) UNIK	
harga	DECIMAL(15,2)	
biaya	DECIMAL(15,2)	
stok	INT	
min_stok	INT DEFAULT 10	
adalah_preorder	BOOLEAN DEFAULT FALSE	
gambar	VARCHAR(255)	

is_active	BOOLEAN DEFAULT TRUE
created_at, updated_at	TIMESTAMP

1:N

1:N

1:N

TRANSACTION_ITEMS	PURCHASE_ITEMS	STOCK_OPNAMES	CONSIGNMENT_INBOUNDS
id (PK)	id (PK)	id (PK)	id (PK)
transaction_id (FK)	purchase_id (FK)	product_id (FK)	product_id (FK)
product_id (FK)	product_id (FK)	system_stock	supplier_name
quantity	quantity (FK)	physical_stk	quantity
price	price	difference	consign_price
discount	subtotal	notes	sell_price
subtotal	created_at	audited_by	commission
created_at		audited_at	created_at

N:1

N:1

TRANSACTIONS

PURCHASES

id (PK)	id (PK)
transaction_no	purchase_no
user_id (FK)	supplier_id (FK)
cashier_id (FK)	purchase_date
voucher_id (FK)	total_amount
total_amount	status
discount_amount	created_by
final_amount	created_at
payment_method	
payment_status	
status	
notes	N:1
created_at	

SUPPLIERS

N:1

id (PK)

name	
VOUCHERS	contact
address	
id (PK)	term_payment

is_active BOOLEAN DEFAULT TRUE
created_at, updated_at TIMESTAMP

1:N

1:N

1:N

TRANSACTION_ITEMS

PURCHASE_ ITEMS

STOCK_
OPNAMES

CONSIGNMENT_ DI DALAM BATAS

id (PK)
transaction_id
(FK)
product_id (FK)
quantity
price
diskon
subtotal
dibuat_pada

id (PK)
purchase_id
(FK)
product_id
(FK)
jumlah
harga
subtotal
 dibuat pada

id (PK)
product_id
(FK)
sistem_stok
fisik_stk ju
perbedaan
catatan
diaudit_oleh
diaudit_pada

id (PK)
id_produk
(FK)
nama_pemasok
harga_konsinyasi
harga_jual
komisi
dibuat pada

N:1

N:1

TRANSAKSI

PEMBELIAN

id (PK)
nomor_transaksi
id_pengguna (FK)
id_kasir (FK)
id_voucher (FK)
total_jumlah
jumlah_diskon
jumlah_akhir
metode_pembayaran
status_pembayaran

id (PK)
nomor_pembelian
id_pemasok
 id_kasir
 (FK) (FK)

tanggal_pembelian
total_jumlah

status

dibuat_oleh
dibuat_pada

status
catatan
dibuat pada

N:1

PENYUPLAI

N:1

VOUCHERS

	id (PK)
	nama
	kontak
	alamat
id (PK)	syarat_pembayaran

```

code (UNIQUE)           created_at
type
value
min_purchase
max_usage
used_count
start_date
end_date
is_active
created_at

```

EXPENSE_CATEGORIES 1:N EXPENSES

id (PK)	id (PK)
name	category_id (FK)
description	date
created_at	amount
	description
	receipt
	approved_by (FK)
	approved_at
	created_at

Relasi Utama: - categories → products : 1:N - products → transaction_items : 1:N - transactions → transaction_items : 1:N - users → transactions : 1:N (as customer & as cashier) - vouchers → transactions : 1:N - suppliers → purchases : 1:N - purchases → purchase_items : 1:N - expense_categories → expenses : 1:N

1.3.4 MODULE 4: ACCOUNTING

ACCOUNT_CATEGORIES

id (PK)	
name	→ Aset, Liabilitas, Modal, Pendapatan, Biaya
type	→ asset, liability, equity, revenue, expense
created_at	

1:N

ACCOUNTS (COA)

id	BIGINT UNSIGNED (PK)
-----------	----------------------

kode (UNIK)	dibuat_pada
tipe	
nilai	
min_pembelian	
max_penggunaan	
jumlah_digunakan	
n_tanggal_mulai	
tanggal_selesai	
aktif	
dibuat_pada	

KATEGORI_BIAYA	1:N	BIAYA
id (PK)		id (PK)
nama		category_id (FK)
deskripsi		tanggal
dibuat_pada		jumlah
	deskripsi	
		kwitansi
		disetujui_oleh (FK)
		disetujui_pada
		dibuat_pada

Relasi Utama: - categories → products : 1:N - products → transaction_items : 1:N - transactions → transaction_items : 1:N - users → transactions : 1:N (sebagai pelanggan & kasir) - vouchers → transactions : 1:N - suppliers → purchases : 1:N - purchases → purchase_items : 1:N - expense_categories → expenses : 1:N

1.3.4 MODUL 4: AKUNTANSI

KATEGORI_AKUN

id (PK)	
nama	→ Aset, Liabilitas, Modal, Pendapatan, Biaya →
tipe	asset, liability, equity, revenue, expense
dibuat_pada	

1:N

AKUN (COA)

id	BIGINT TANPA TANDA (PK)
-----------	-------------------------

category_id	BIGINT UNSIGNED (FK)	→ account_categories.id
code	VARCHAR(20) UNIQUE	→ 1101, 2301, 3101
name	VARCHAR(255)	→ Kas, Hutang Bank, Modal
description	TEXT	
is_active	BOOLEAN DEFAULT TRUE	
created_at, updated_at	TIMESTAMP	

1:N

JOURNAL_ENTRY_LINES

id	BIGINT UNSIGNED (PK)	
journal_entry_id	BIGINT UNSIGNED (FK)	→ journal_entries.id
account_id	BIGINT UNSIGNED (FK)	→ accounts.id
debit	DECIMAL(15,2) DEFAULT 0	
credit	DECIMAL(15,2) DEFAULT 0	
description	VARCHAR(255)	
created_at	TIMESTAMP	

N:1

JOURNAL_ENTRIES

id	BIGINT UNSIGNED (PK)	
journal_number	VARCHAR(50) UNIQUE	→ JRN-20260117-0001
transaction_date	DATE	
description	TEXT	
reference_type	VARCHAR(255) NULL	→ POLYMORPHIC
reference_id	BIGINT UNSIGNED NULL	→ POLYMORPHIC
total_debit	DECIMAL(15,2)	
total_credit	DECIMAL(15,2)	
status	ENUM('draft','posted')	
created_by	BIGINT UNSIGNED (FK)	
posted_by	BIGINT UNSIGNED (FK) NULL	
posted_at	TIMESTAMP NULL	
created_at, updated_at	TIMESTAMP	

N:1 (optional)

BANK_TRANSACTIONS

id	BIGINT UNSIGNED (PK)	
transaction_date	DATE	
description	VARCHAR(255)	

category_id	BIGINT UNSIGNED (FK)	
kode	VARCHAR(20) UNIK	→ account_categories.id → 1101, 2301, 3101
nama	VARCHAR(255)	
deskripsi	TEKS	→ Kas, Hutang Bank, Modal
is_active	BOOLEAN DEFAULT TRUE	
created_at, updated_at	TIMESTAMP	

1:N

JOURNAL_ENTRY_LINES

id	BIGINT UNSIGNED (PK)	
journal_entry_id	BIGINT UNSIGNED (FK)	→ journal_entries.id
account_id	BIGINT UNSIGNED (FK)	→ accounts.id
debit	DECIMAL(15,2) DEFAULT 0	
credit	DECIMAL(15,2) DEFAULT 0	
description	VARCHAR(255)	
created_at	TIMESTAMP	

N:1

JOURNAL_ENTRIES

id	BIGINT UNSIGNED (PK)	
nomor_jurnal	VARCHAR(50) UNIK	→ JRN-20260117-0001
tanggal_transaksi	TANG GAL	
deskripsi	TEKS	
jenis_referensi	VARCHAR(255)	→ POLYMORPHIC
id_referensi	NULLBIGINT UNSIGNED	→ POLYMORPHIC
total_debit	NULLDECIMAL(15,2)	
total_kredit	DECIMAL(15,2) ENUM	
status	('draft','posted')BIGINT	
dibuat_oleh	UNSIGNED (FK)BIGINT	
diposting_oleh	UNSIGNED (FK)	
diposting_pada	NULLTIMESTAMP NULL	
created_at, updated_at	TIMESTAMP	

N:1 (optional)

BANK_TRANSACTIONS

id	BIGINT UNSIGNED (PK)	
transaction_date	TANG GAL	
deskripsi	VARCHAR(255)	

```

debit          DECIMAL(15,2) DEFAULT 0
credit         DECIMAL(15,2) DEFAULT 0
balance        DECIMAL(15,2)
journal_entry_id BIGINT UNSIGNED (FK) NULL      → journal_entries.id
status          ENUM('pending','matched',
                     'reconciled')
notes           TEXT
created_at      TIMESTAMP

```

Relasi: - account_categories → accounts : 1:N - accounts → journal_entry_lines : 1:N
- journal_entries → journal_entry_lines : 1:N - journal_entries [loans, transactions, expenses] : POLYMORPHIC N:1 - bank_transactions → journal_entries : N:1 (for reconciliation)

1.3.5 MODULE 5: ORGANIZATION & DOCUMENTS

ORGANIZATION_ASSETS

```

id            BIGINT UNSIGNED (PK)
name          VARCHAR(255)
category      ENUM('tanah','bangunan',
                  'kendaraan','elektronik',
                  'furniture')
purchase_date DATE
purchase_price DECIMAL(15,2)
current_value DECIMAL(15,2)
condition     ENUM('baik','rusak','hilang')
location      VARCHAR(255)
notes         TEXT
created_at    TIMESTAMP

```

ORGANIZATION_MEETINGS

```

id            BIGINT UNSIGNED (PK)
meeting_date DATE
meeting_type ENUM('pengurus','anggota',
                  'rat')
agenda        TEXT
decisions     TEXT
attendees     TEXT
notes         TEXT
created_by    BIGINT UNSIGNED (FK)
created_at    TIMESTAMP

```

debit	DECIMAL(15,2) DEFAULT 0
kredit	DECIMAL(15,2) DEFAULT 0
saldo	DECIMAL(15,2)
id_jurnal_entri	BIGINT UNSIGNED (FK) NULL → journal_entries.id
status	ENUM ('pending', 'matched', 'reconciled')
catatan	TEKS
dibuat_pada	TIMESTAMP

Relasi: - account_categories → accounts : 1:N - accounts → journal_entry_lines : 1:N-
 journal_entries → journal_entry_lines : 1:N - journal_entries [loans, transactions,expenses] :
 POLYMORPHIC N:1 - bank_transactions → journal_entries : N:1 (untuk rekonsiliasi)

1.3.5 MODUL 5: ORGANISASI & DOKUMEN

ASSET_ORGANISASI

id	BIGINT UNSIGNED (PK)
nama	VARCHAR(255) ENUM ('tanah', 'bangunan', 'kendaraan', 'elektronik', 'furniture')
kategori	
tanggal_pembelian	TANG GAL
harga_pembelian	DECIMAL(15,2)
nilai_sekarang	DECIMAL(15,2)
kondisi	ENUM('baik', 'rusak', 'hilang')
lokasi	VARCHAR(255)
catatan	TEKS
dibuat_pada	TIMESTAMP

PERTEMUAN_ORGANISASI

id	BIGINT TANPA TANDA (PK)
tanggal_pertemuan	TANG GAL
jenis_pertemuan	ENUM('pengurus', 'anggota', 'rat')
agenda	TEKS
keputusan	TEKS
peserta	TEKS
catatan	TEKS
dibuat_oleh	BIGINT TIDAK TANDA (FK)
dibuat_pada	TIMESTAMP

ORGANIZATION_PROFILES

<code>id</code>	BIGINT UNSIGNED (PK)
<code>name</code>	VARCHAR(255)
<code>position</code>	VARCHAR(100)
<code>period_start</code>	DATE
<code>period_end</code>	DATE
<code>phone</code>	VARCHAR(20)
<code>photo</code>	VARCHAR(255)
<code>created_at</code>	TIMESTAMP

DOCUMENT_TEMPLATES

<code>id</code>	BIGINT UNSIGNED (PK)
<code>name</code>	VARCHAR(255)
<code>type</code>	ENUM('official','membership', 'loan','other')
<code>content</code>	LONGTEXT
<code>placeholders</code>	JSON
<code>created_at</code>	TIMESTAMP

`1:N` (via `document_type`)

GENERATED_DOCUMENTS

<code>id</code>	CHAR(36) (PK, UUID)
<code>document_number</code>	VARCHAR(50)
<code>document_type</code>	VARCHAR(255)
<code>user_id</code>	BIGINT UNSIGNED (FK) <code>NULL</code>
<code>generated_by</code>	BIGINT UNSIGNED (FK) <code>NULL</code>
<code>data</code>	JSON
<code>reference_type</code>	VARCHAR(255) <code>NULL</code>
<code>reference_id</code>	BIGINT UNSIGNED <code>NULL</code>
<code>verified_at</code>	TIMESTAMP <code>NULL</code>
<code>created_at</code>	TIMESTAMP

Polymorphic Relation: - `generated_documents.reference_type + reference_id` bisa ke: - Member (untuk Kartu Anggota) - ShuDistribution (untuk SHU Slip)

PROFIL_ORGANISASI

id	BIGINT TANPA TANDA (PK)
nama	VARCHAR(255)
posisi	VARCHAR(100)
periode_mulai	TANG GAL
periode_selesai	TANG GAL
telepon	VARCHAR(20)
foto	VARCHAR(255)
dibuat_pada	TIMESTAMP

TEMPLATE_DOKUMEN

id	BIGINT TANPA TANDA (PK)
name	VARCHAR(255)
type	ENUM('resmi', 'keanggotaan', 'pinjaman', 'lainnya')
konten	LONGTEXT
placeholder	JSON
dibuat_pada	TIMESTAMP

1:N (via jenis_dokumen)

DOKUMEN_YANG_DIHASILKAN

id	CHAR(36) (PK, UUID)	
nomor_dokumen	VARCHAR(50)	→ 001/UND/I/2026
jenis_dokumen	VARCHAR(255)	→ Surat Undangan
user_id	BIGINT UNSIGNED (FK) NULL	→ users.id (creator)
generated_by	BIGINT UNSIGNED (FK) NULL	→ users.id
data	JSON	→ Filled placeholders →
reference_type	VARCHAR(255) NULL	POLYMORPHIC
reference_id	BIGINT UNSIGNED	→ POLYMORPHIC
verified_at	NULLTIMESTAMP	
created_at	NULLTIMESTAMP	

Polymorphic Relation: - generated_documents.reference_type + reference_id bisa ke: - Member (untuk Kartu Anggota) - ShuDistribution (untuk SHU Slip)

1.3.6 MODULE 6: COMMUNICATION

ANNOUNCEMENTS

```
id          BIGINT UNSIGNED (PK)
title        VARCHAR(255)
content      TEXT
image        VARCHAR(255) NULL
is_active    BOOLEAN DEFAULT TRUE
published_at TIMESTAMP NULL
created_by   BIGINT UNSIGNED (FK)
created_at  TIMESTAMP
```

POLLS

```
id          BIGINT UNSIGNED (PK)
title        VARCHAR(255)
description  TEXT
start_date   DATE
end_date     DATE
is_active    BOOLEAN DEFAULT TRUE
created_by   BIGINT UNSIGNED (FK)
created_at  TIMESTAMP
```

1:N

POLL_OPTIONS

```
id          BIGINT UNSIGNED (PK)
poll_id     BIGINT UNSIGNED (FK)      → polls.id
option_text  VARCHAR(255)
votes_count INT DEFAULT 0
created_at  TIMESTAMP
```

1:N

POLL_VOTES

```
id          BIGINT UNSIGNED (PK)
poll_option_id BIGINT UNSIGNED (FK)      → poll_options.id
user_id     BIGINT UNSIGNED (FK)      → users.id
voted_at   TIMESTAMP
```

1.3.6 MODUL 6: KOMUNIKASI

PENGUMUMAN

id	BIGINT TIDAK TANDA
judul	(PK) VARCHAR(255)
konten	TEKS
gambar	VARCHAR(255)
aktif	NULLBOOLEAN
diterbitkan_pada	DEFAULT TRUE
dibuat_oleh	TIMESTAMP NULL
dibuat_pada	BIGINT UNSIGNED (FK)
	TIMESTAMP

POLLS

id	BIGINT UNSIGNED (PK)
judul	VARCHAR(255)
deskripsi	TEKS
tanggal_mulai	TANG
tanggal_selesai	GAL
	TANG
	GAL
is_active	BOOLEAN DEFAULT TRUE
created_by	BIGINT UNSIGNED (FK)
created_at	TIMESTAMP

1:N

POLL_OPTIONS

id	BIGINT UNSIGNED (PK)
poll_id	(PK) BIGINT UNSIGNED (FK)
option_text	VARCHAR(255)
votes_count	INT DEFAULT 0
created_at	TIMESTAMP

→ **polls.id**

1:N

SUARA_POLL

id	BIGINT TIDAK TANDA (PK)
id_opsi_poll	BIGINT TIDAK TANDA (FK)
id_pengguna	BIGINT TIDAK TANDA (FK)
waktu_memilih	TIMESTAMP

→ **poll_options.id**
→ **users.id**

MEMBER_ASPIRATIONS

<code>id</code>	<code>BIGINT UNSIGNED (PK)</code>
<code>user_id</code>	<code>BIGINT UNSIGNED (FK)</code>
<code>category</code>	<code>ENUM('layanan', 'produk', 'keluhan', 'saran')</code>
<code>subject</code>	<code>VARCHAR(255)</code>
<code>message</code>	<code>TEXT</code>
<code>status</code>	<code>ENUM('pending', 'reviewed', 'resolved')</code>
<code>admin_response</code>	<code>TEXT NULL</code>
<code>responded_by</code>	<code>BIGINT UNSIGNED (FK) NULL</code>
<code>responded_at</code>	<code>TIMESTAMP NULL</code>
<code>created_at</code>	<code>TIMESTAMP</code>

1.3.7 MODULE 7: SYSTEM

SETTINGS (Key-Value)

<code>id</code>	<code>BIGINT UNSIGNED (PK)</code>
<code>key</code>	<code>VARCHAR(100) UNIQUE</code>
<code>value</code>	<code>TEXT</code>
<code>created_at</code>	<code>TIMESTAMP</code>

AUDIT_LOGS

<code>id</code>	<code>BIGINT UNSIGNED (PK)</code>
<code>user_id</code>	<code>BIGINT UNSIGNED (FK) NULL</code>
<code>action</code>	<code>VARCHAR(50)</code>
<code>model</code>	<code>VARCHAR(255)</code>
<code>model_id</code>	<code>BIGINT UNSIGNED NULL</code>
<code>changes</code>	<code>JSON</code>
<code>ip_address</code>	<code>VARCHAR(45)</code>
<code>user_agent</code>	<code>TEXT</code>
<code>created_at</code>	<code>TIMESTAMP</code>

NOTIFICATIONS (Laravel)

ANGAN-ANGAN_ANGGOTA

id	BIGINT TIDAK TANDA (PK)
user_idkategori	BIGINT TIDAK TANDA (FK) ENUM('layanan', 'produk', 'keluhan', 'saran')
subjek	VARCHAR(255)
pesan	TEKS
status	ENUM('pending', 'ditinjau', 'resolved') TEKS NULL
tanggapan_admin	BIGINT UNSIGNED (FK)
dijawab_oleh	NULLTIMESTAMP
dijawab_pada	NULLTIMESTAMP
dibuat_pada	

1.3.7 MODUL 7: SISTEM

PENGATURAN (Kunci-Nilai)

id	BIGINT UNSIGNED (PK)
keyvalue	VARCHAR(100) UNIK
lue	TEKS
created_at	CAP WAKTU

LOG AUDIT

id	BIGINT TIDAK TANDA (PK)	
id_pengguna_tindakan	BIGINT TIDAK TANDA (FK)	→ buat, perbarui, hapus → Anggota, Pinjaman, dll
model	NULLVARCHAR(50)	
id_model_perubahan	VARCHAR(255) BIGINT UNSIGNED NULL	→ Nilai sebelum/setelah
perubahan	JSON	
alamat_ip	VARCHAR(45)	
agen_pengguna	TEKS	
dibuat_pada	TIMESTAMP	

NOTIFIKASI (Laravel)

```

id           CHAR(36) (PK, UUID)
type         VARCHAR(255)
notifiable_type  VARCHAR(255)          → User
notifiable_id    BIGINT UNSIGNED
data          JSON
read_at       TIMESTAMP NULL
created_at    TIMESTAMP

```

1.4 FOREIGN KEY RELATIONSHIPS

1.4.1 Critical Foreign Keys:

```

-- User & Member
ALTER TABLE members
  ADD CONSTRAINT fk_members_user
  FOREIGN KEY (user_id) REFERENCES users(id)
  ON DELETE CASCADE;

-- Finance
ALTER TABLE savings
  ADD CONSTRAINT fk_savings_member
  FOREIGN KEY (member_id) REFERENCES members(id);

ALTER TABLE loans
  ADD CONSTRAINT fk_loans_member
  FOREIGN KEY (member_id) REFERENCES members(id);

ALTER TABLE loan_payments
  ADD CONSTRAINT fk_loan_payments_loan
  FOREIGN KEY (loan_id) REFERENCES loans(id)
  ON DELETE CASCADE;

-- Commerce
ALTER TABLE products
  ADD CONSTRAINT fk_products_category
  FOREIGN KEY (category_id) REFERENCES categories(id);

ALTER TABLE transaction_items
  ADD CONSTRAINT fk_transaction_items_trans
  FOREIGN KEY (transaction_id) REFERENCES transactions(id)
  ON DELETE CASCADE;

ALTER TABLE transaction_items
  ADD CONSTRAINT fk_transaction_items_product
  FOREIGN KEY (product_id) REFERENCES products(id);

```

id	CHAR(36) (PK,
tipe	UUID) VARCHAR
jenis_notifikasi	(255) VARCHAR
notifikasi_iddata	(255) BIGINT UNSIGNEDJSON
dibaca_pada	TIMESTAMP NULL
dibuat_pada	TIMESTAMP

1.4 HUBUNGAN KUNCI ASING

1.4.1 Kunci Asing Kritis:

-- Pengguna & Anggota

```
ALTER TABLE anggota
    ADD CONSTRAINT fk_anggota_pengguna
    FOREIGN KEY (user_id) REFERENCES
    pengguna(id) ON DELETE CASCADE;
```

-- Keuangan

```
ALTER TABLE tabungan
    ADD CONSTRAINT fk_tabungan_anggota
    FOREIGN KEY (member_id) REFERENCES anggota(id);
```

ALTER TABLE pinjaman

```
    ADD CONSTRAINT fk_pinjaman_anggota
    FOREIGN KEY (member_id) REFERENCES members(id);
```

ALTER TABLE loan_payments

```
    ADD CONSTRAINT
    fk_loan_payments_loanFOREIGN KEY (loan_id)
    REFERENCES loans(id) ON DELETE CASCADE;
```

-- Perdagangan

```
ALTER TABLE products
    ADD CONSTRAINT fk_products_category
    FOREIGN KEY (category_id) REFERENCES categories(id);
```

ALTER TABLE transaction_items

```
    ADD CONSTRAINT fk_transaction_items_trans
    FOREIGN KEY (transaction_id) REFERENCES transactions(id)
    ON DELETE CASCADE;
```

ALTER TABLE transaction_items

```
    TAMBAH BATASAN fk_transaction_items_productKUNCI
    ASING (product_id) MENGACU PADA products(id);
```

```
-- Accounting
ALTER TABLE journal_entry_lines
    ADD CONSTRAINT fk_journal_lines_entry
        FOREIGN KEY (journal_entry_id) REFERENCES journal_entries(id)
        ON DELETE CASCADE;

ALTER TABLE journal_entry_lines
    ADD CONSTRAINT fk_journal_lines_account
        FOREIGN KEY (account_id) REFERENCES accounts(id);
```

1.5 INDEXES & OPTIMIZATION

1.5.1 Primary Keys:

All tables have id as **BIGINT UNSIGNED AUTO_INCREMENT PRIMARY KEY**

1.5.2 Unique Constraints:

```
-- Users
users.email (UNIQUE)

-- Members
members.user_id (UNIQUE)
members.member_id (UNIQUE)
members.employee_id (UNIQUE)

-- Products
products.barcode (UNIQUE)

-- Accounts
accounts.code (UNIQUE)

-- Settings
settings.key (UNIQUE)

-- Documents
document_templates.name (UNIQUE per type)
generated_documents.document_number (UNIQUE)
```

1.5.3 Composite Indexes:

```
-- For performance optimization
INDEX idx_trans_date_status ON transactions(transaction_date, status);
INDEX idx_shu_year_member ON shu_distributions(period_year, member_id);
INDEX idx_loan_status ON loans(status, approved_at);
INDEX idx_savings_member_date ON savings(member_id, transaction_date);
INDEX idx_journal_reference ON journal_entries(reference_type, reference_id);
```

```
-- Akuntansi
ALTER TABLE journal_entry_lines
    ADD CONSTRAINT fk_journal_lines_entry
        FOREIGN KEY (journal_entry_id) REFERENCES journal_entries(id)
        ON DELETE CASCADE;

ALTER TABLE journal_entry_lines
    ADD CONSTRAINT fk_journal_lines_account
        FOREIGN KEY (account_id) REFERENCES accounts(id);
```

1.5 INDEKS & OPTIMISASI

1.5.1 Kunci Utama:

Semua tabel memiliki id sebagai BIGINT UNSIGNED AUTO_INCREMENT PRIMARY

KEY1.5.2 Pembatasan Unik:

-- Pengguna

users.email (UNIQUE)

-- Anggota

members.user_id (UNIQUE)
members.member_id (UNIQUE)
members.employee_id (UNIQUE)

-- Produk

products.barcode (UNIQUE)

-- Akun

accounts.code (UNIQUE)

-- Pengaturan

settings.key (UNIQUE)

-- Dokumen

document_templates.name (UNIK per tipe)
generated_documents.document_number (UNIK)

1.5.3 Indeks Komposit:

-- Untuk optimasi kinerja

```
INDEX idx_trans_date_status ON transactions(transaction_date, status);
INDEX idx_shu_year_member ON shu_distributions(period_year, member_id);
INDEX idx_loan_status ON loans(status, approved_at);
INDEX idx_savings_member_date ON savings(member_id, transaction_date);
INDEX idx_journal_reference ON journal_entries(reference_type, reference_id);
```

1.6 DATA INTEGRITY RULES

1.6.1 Constraints:

1. Balance Validation:

- `members.credit_used <= members.credit_limit`
- `journal_entries.total_debit = journal_entries.total_credit`

2. Status Transitions:

- `loans.status`: pending → approved → active → completed
- `withdrawal_requests.status`: pending → approved → completed

3. Date Logic:

- `organization_profiles.period_end > period_start`
- `polls.end_date > start_date`

4. Cascading Deletes:

- Delete user → delete member profile
- Delete loan → delete loan_payments
- Delete transaction → delete transaction_items
- Delete journal_entry → delete journal_entry_lines

5. Soft Deletes:

- **NOT USED** - Hard delete with audit log trail
-

1.7 STATISTICS & CAPACITY

Metric	Value
Total Tables	~65
Tables with FK	~45
Total Indexes	~120+
Avg Columns per Table	8-12
Max Text/JSON Fields	15 tables
Polymorphic Relations	2 (<code>journal_entries</code> , <code>generated_documents</code>)
Expected DB Size (1 year)	~500MB - 2GB
Expected Growth Rate	~100MB/year

1.8 BACKUP STRATEGY

Automated Daily Backup:

```
# Laravel command
php artisan backup:run
```

```
# Manual MySQL dump
mysqldump -u root koperasi > backup_$(date +%Y%m%d).sql
```

1.6 ATURAN INTEGRITAS DATA

1.6.1 Pembatasan:

1. Validasi Saldo:

- members.credit_used <= members.credit_limit
- journal_entries.total_debit = journal_entries.total_credit

2. Transisi Status:

- loans.status: pending → approved → active → completed
- withdrawal_requests.status: pending → approved → completed

3. Logika Tanggal:

- organization_profiles.period_end > period_start
- polls.end_date > start_date

4. Penghapusan Berantai:

- Hapus pengguna → hapus profil anggota
- Hapus pinjaman → hapus pembayaran_pinjaman
- Hapus transaksi → hapus item_transaksi
- Hapus jurnal_entri → hapus garis_jurnal_entri

5. Penghapusan Lunak:

- TIDAK DIGUNAKAN - Hapus keras dengan jejak log audit

1.7 STATISTIK & KAPASITAS

Metrik	Nilai
Total Tabel	~65
Tabel dengan FK	~45
Total Indeks	~120+
Rata-rata	Rata-rata
Kolom per Tabel	Kolom per
Max	Tabel 8-12
Teks/JSON	15 tabel
Fields Relasi Polimorfik	Relasi Polimorfik 2 (journal_entries, generated_documents)
Ukuran DB yang Diharapkan (1 tahun)	~500MB - 2GB
Tingkat Pertumbuhan yang Diharapkan	~100MB/tahun

1.8 STRATEGI CADANGAN

Cadangan Harian Otomatis:

```
# perintah Laravel  
php artisan backup:run
```

```
# dump MySQL Manual  
mysqldump -u root koperasi > backup_$(date +%Y%m%d).sql
```

Retention Policy: - Daily backups: Keep 30 days - Weekly backups: Keep 3 months - Monthly backups: Keep 1 year

1.9 MIGRATION MANAGEMENT

Location: database/migrations/

Total Migrations: 65+ files

Naming Convention: YYYY_MM_DD_HHMMSS_descriptive_name.php

Run Migrations:

```
# Fresh install
php artisan migrate:fresh --seed
```

```
# Production (safe)
php artisan migrate
```

```
# Rollback last batch
php artisan migrate:rollback
```

```
# Check status
php artisan migrate:status
```

1.10 SCHEMA VERSIONING

Current Schema Version: 2.0

Last Updated: 17 January 2026

Major Changes: - v1.0 (Dec 2025): Initial schema - v1.5 (Jan 2026): Added document generator tables - v2.0 (Jan 2026): Accounting module + bank reconciliation

Maintainer: Database Team

Contact: dev@kopkarskf.com

Kebijakan Retensi: - Cadangan harian: Simpan 30 hari - Cadangan mingguan: Simpan 3 bulan
- Cadangan bulanan: Simpan 1 tahun

1.9 MANAJEMEN MIGRASI

Lokasi: database/migrations/

Total Migrasi: 65+ file

Konvensi Penamaan:

YYYY_MM_DD_HHMMSS_nama_deskriptif.php Jalankan Migrasi:

Instalasi baru

```
php artisan migrate:fresh --seed
```

Produksi (aman)

```
php artisan migrate
```

Rollback batch terakhir

```
php artisan migrate:rollback
```

Periksa status

```
php artisan migrate:status
```

1.10 VERSI SKEMA

Versi Skema Saat Ini: 2.0

Terakhir Diperbarui: 17 Januari 2026

Perubahan Besar: - v1.0 (Des 2025): Skema awal - v1.5 (Jan 2026): Menambahkan tabel generator dokumen - v2.0 (Jan 2026): Modul akuntansi + rekonsiliasi bank

Pemelihara: Tim DatabaseKontak:

dev@kopkarskf.com