

Figure Address Book database relationship model

1. **Tables**

- **entry**: storing Contacts info

- **city**: storing Cities info

- **group**: storing Group info

- **group\_entry**: entries(Contacts) added directly to group will be stored in this table

- **group\_connector**: storing relationship between group, it means group inheritance. Column **is\_inherited** indicates whether a child group inherited directly from parent group.

***For example:***

We have groups A (id: 1), B (id: 2), C (id: 3), D (id: 4), E (id: 5).

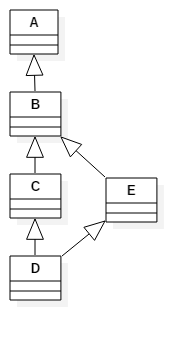
Group B is child of group A

Group C is child of group B

Group E is child of group B

Group D is child of group C

Group D is child of group E (see image)



So, table **group\_connector** will contains records as:

|  |  |  |  |
| --- | --- | --- | --- |
| group\_connector\_id | parent\_group\_id | child\_group\_id | is\_inherited |
| 1 | 1 | 2 | 0 |
| 2 | 2 | 3 | 0 |
| 3 | 1 | 3 | 1 |
| 4 | 3 | 4 | 0 |
| 5 | 2 | 4 | 1 |
| 6 | 1 | 4 | 1 |
| 7 | 2 | 5 | 0 |
| 8 | 1 | 5 | 1 |
| 9 | 5 | 4 | 0 |
| 10 | 2 | 4 | 1 |
| 11 | 1 | 4 | 1 |

- **group\_connector\_path**: storing inheritance path of indirect group connection.

***For example:*** with group A, B, C, D, E above, table **group\_connector\_path** will contains records as:

|  |  |  |
| --- | --- | --- |
| group\_connector\_id | parent\_group\_id | child\_group\_id |
| 3 | 1 | 2 |
| 3 | 2 | 3 |
| 5 | 2 | 3 |
| 5 | 3 | 4 |
| 6 | 1 | 2 |
| 6 | 2 | 3 |
| 6 | 3 | 4 |
| 8 | 1 | 2 |
| 8 | 2 | 5 |
| 10 | 2 | 5 |
| 10 | 5 | 4 |
| 11 | 1 | 2 |
| 11 | 2 | 5 |
| 11 | 5 | 4 |

1. **Queries**
   1. **Getting all Contacts of one Group by group\_id:**

Contacts are fetched from 2 sources: Contacts added directly to this group (table **group\_entry**), and Contacts from parent groups (table **group\_connector**).

SELECT DISTINCT `entry`.`entry\_id`, `entry`.`name`, `entry`.`first\_name`, `entry`.`street`, `entry`.`zip\_code`, `entry`.`city\_id`, MIN(`entry`.`is\_inherited`) AS 'is\_inherited'

FROM

(SELECT `entry`.\*, 0 AS 'is\_inherited'

FROM `entry` INNER JOIN `group\_entry` ON `entry`.`entry\_id` = `group\_entry`.`entry\_id`

WHERE `group\_entry`.`group\_id` = $group\_id

UNION

SELECT DISTINCT `entry`.\*, 1 AS 'is\_inherited'

FROM `entry` INNER JOIN `group\_entry` ON `entry`.`entry\_id` = `group\_entry`.`entry\_id`

INNER JOIN `group\_connector` ON `group\_entry`.`group\_id` = `group\_connector`.`parent\_group\_id`

WHERE `group\_connector`.`child\_group\_id` = $group\_id) AS `entry`

GROUP BY `entry`.`entry\_id`

ORDER BY `entry`.`is\_inherited`, `entry`.`entry\_id`

* 1. **Adding one new Group connection:**

For example: we want group D to be child of group C

B1. Add one new record to table **group\_connector** to indicate that this group inherited directly from one parent group:

INSERT INTO `group\_connector`(`parent\_group\_id`, `child\_group\_id`, `is\_inherited`) VALUES (3, 4, 0)

B2. Find out all parent groups of group C:

SELECT \* FROM `group\_connector` WHERE `child\_group\_id` = 3

B3. Find out all child groups of group D:

SELECT \* FROM `group\_connector` WHERE `parent\_group\_id` = 4

B4. Add new records to table **group\_connector** to indicate that groups step B3 + D inherited indirectly from groups step B2 + C:

foreach $parent\_groups as $parent\_group, $child\_groups as $child\_group

INSERT INTO `group\_connector`(`parent\_group\_id`, `child\_group\_id`, `is\_inherited`) VALUES ($parent\_group->parent\_group\_id, $child\_group->child\_group\_id, 1)

B5. Add new records to table **group\_connector\_path** to store path of each indirect group connection:

foreach $parent\_groups as $parent\_group, $child\_groups as $child\_group

// Add new record to table **group\_connector** to indicate that this group inherited indirectly from parent group. $group\_connector\_id retrieved after step B4 done

if $parent\_group->is\_inherited = 1

// Path retrieved from $parent\_group

INSERT INTO `group\_connector\_path`(`group\_connector\_id`, `parent\_group\_id`, `child\_group\_id`) SELECT $group\_connector\_id AS `group\_connector\_id`, `parent\_group\_id`, `child\_group\_id` FROM `group\_connector\_path` WHERE `group\_connector\_id` = $parent\_group->group\_connector\_id

else

// Path from $parent\_group->parent\_group\_id to $parent\_group->child\_group\_id

INSERT INTO `group\_connector\_path`(`group\_connector\_id`, `parent\_group\_id`, `child\_group\_id`) VALUES ($group\_connector\_id, $parent\_group->parent\_group\_id, $parent\_group->child\_group\_id)

Endif

if $child\_group->is\_inherited = 1

// Path retrieved from $child\_group

INSERT INTO `group\_connector\_path`(`group\_connector\_id`, `parent\_group\_id`, `child\_group\_id`) SELECT $group\_connector\_id AS `group\_connector\_id`, `parent\_group\_id`, `child\_group\_id` FROM `group\_connector\_path` WHERE `group\_connector\_id` = $child\_group->group\_connector\_id

else

// Path from $ child\_group->parent\_group\_id to $ child\_group->child\_group\_id

INSERT INTO `group\_connector\_path`(`group\_connector\_id`, `parent\_group\_id`, `child\_group\_id`) VALUES ($group\_connector\_id, $child\_group->parent\_group\_id, $child\_group->child\_group\_id)

endif

// Path from $parent\_group\_id to $child\_group\_id

INSERT INTO `group\_connector\_path`(`group\_connector\_id`, `parent\_group\_id`, `child\_group\_id`) VALUES ($group\_connector\_id, 3, 4)

* 1. **Removing one Group connection**

For example: we want to remove connection between group A and group B

C1. Remove record that has `is\_inherited`=0 from table **group\_connector**:

DELETE FROM `group\_connector` WHERE `parent\_group\_id` = 1 AND `child\_group\_id` = 2 AND `is\_inherited` = 0

C2. Find out all indirect group connections from table **group\_connector**:

SELECT `group\_connector`.\*

FROM `group\_connector` INNER JOIN `group\_connector\_path` ON `group\_connector`.`group\_connector\_id` = `group\_connector\_path`.`group\_connector\_id`

WHERE `group\_connector\_path`.`parent\_group\_id` = 1 AND `group\_connector\_path`.`child\_group\_id` = 2 AND `is\_inherited` = 1

C3. Remove all indirect group connections from table **group\_connector**, and matched records from table **group\_connector\_path**:

// Array $group\_connector\_ids retrieved from step C2

DELETE FROM `group\_connector` WHERE `group\_connector\_id` IN ($group\_connector\_ids)

DELETE FROM `group\_connector\_path` WHERE `group\_connector\_id` IN ($group\_connector\_ids)

* 1. **Adding one Contact to one Group**

INSERT INTO `group\_entry`(`group\_id`, `entry\_id`) VALUES ($group\_id, $entry\_id)

* 1. **Removing Contact from one Group**

DELETE FROM `group\_entry` WHERE `group\_id` = $group\_id AND `entry\_id` = $entry\_id