

# Recursion, Pivoting & Sampling



# Overview

- Recursion is a way to work with hierarchies
- Random row selection useful for aggregates
- Pivot/Unpivot
  - classic aggregate view
  - entity↗attribute ↘value

# Recursion

- **Function calls itself**
  - until it thinks it's done
- **Phases**
  - initialization
  - recursion
  - return value upon completion

*initialize*    call f1(A=3, B=4)

*recursive call*    call f1(A=A<sup>2</sup> - 1, B=B<sup>12</sup> \* A)

*recursive call*    call f1(A=A<sup>1</sup> - 1, B=B<sup>24</sup> \* A)

*test for completion*    if A <= 1 then return B<sup>24</sup>

# Recursive Query

- CTE
- Initialization `union all` recursion *recursive function*
- End of recursion
- Return results

3, 4  
2, 12  
1, 24

```
with f1(A, B)
as
(
  select 3, 4
  union all
  select A-1, B * A from f1
  where not A <= 1
)
select A, B from f1
```

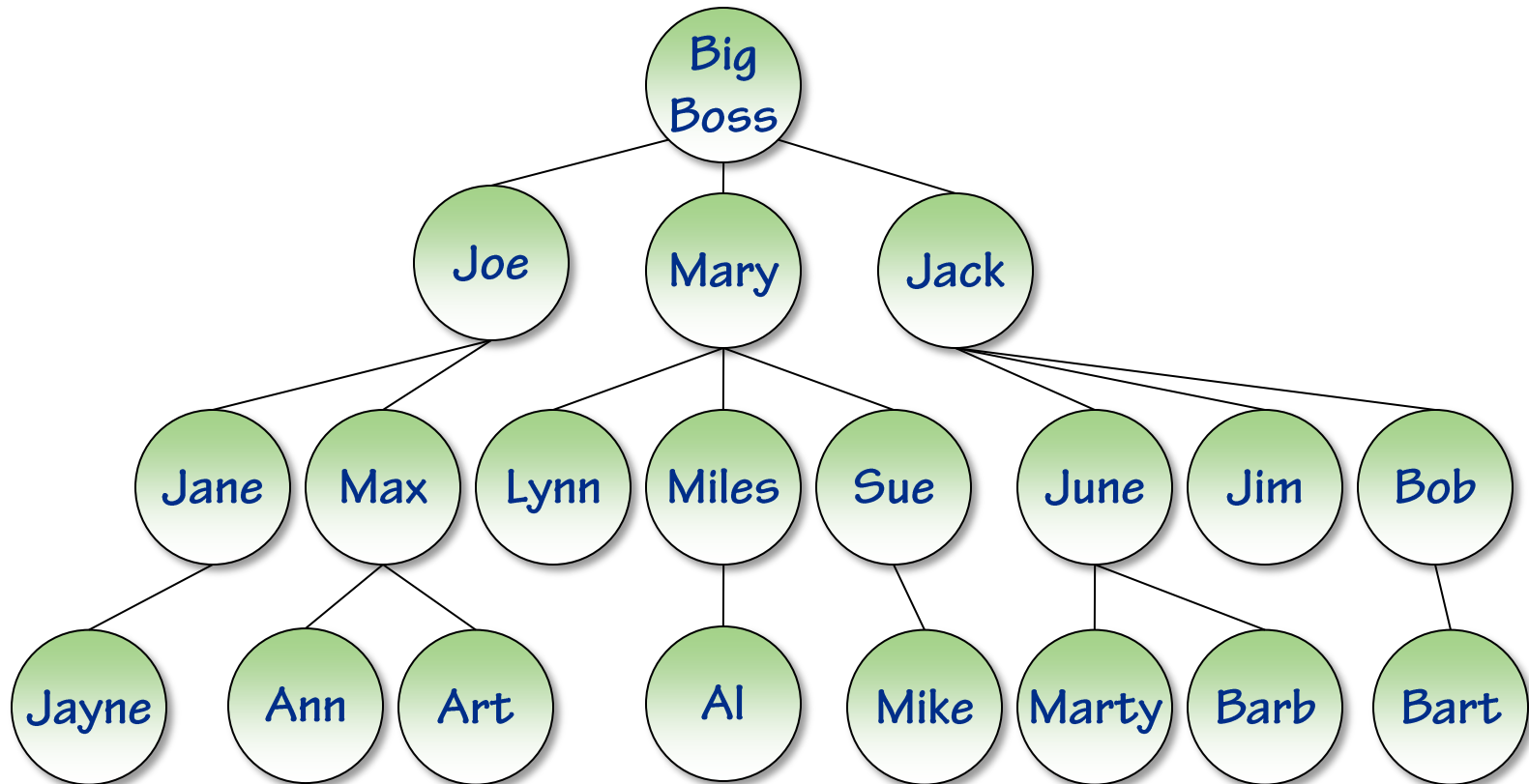
*initialization*

*recursive call*

*test for completion*

*returns*

A	B
3	4
2	12
1	24



# Pivot

- Cross tabulated column values
- Tabular view of entity attribute tables

daily payment comparison  
raw sales totals

date	VISA	AmEx	MasterCard	payment
2000-01-01	87	75	78	Cash
2000-01-02	69	92	82	AmEx
2000-01-03	100	93	93	Mastercard
2000-01-04	97	89	103	Cash
2000-01-05	88	71	68	VISA
			Cash	

# Pivot

- Cross tabulated column values
- Entity/attribute tables

id	color	name	len	width	fiber
2	rose	Attach	1 ft	1 ft	wool
5	pink	Rug	.25 in	.25 in	wool
8	purple	Swish	1 ft	1 ft	wool
11	red	Attach	.25 in	.25 in	wool
14	black	Rug	1 ft	1 ft	wool

entity table

rug entity

color: rose

width: 1 ft

fiber: wool

swish entity

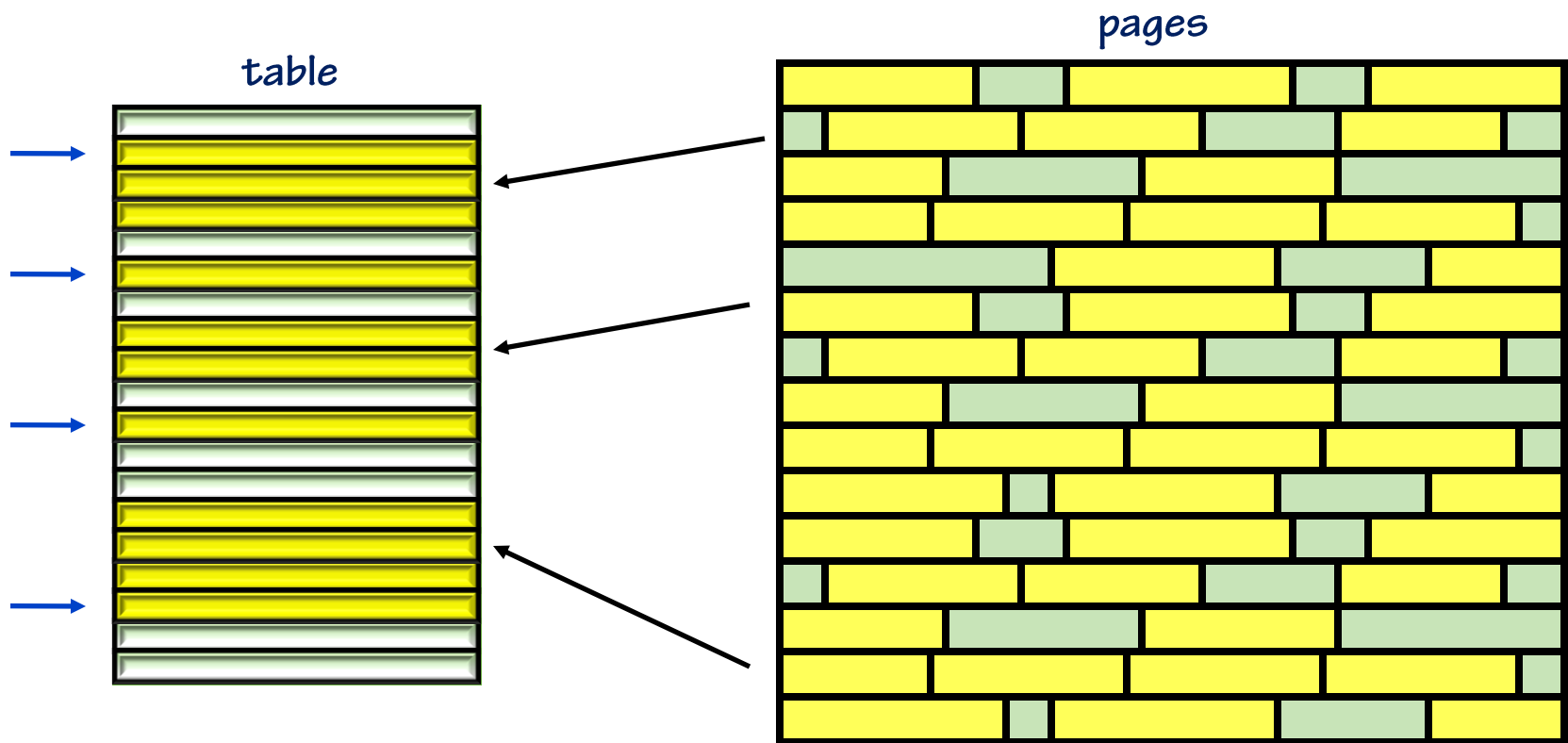
swish table

id	color	type	amount
3	sandy brown	acrylic	1 gal
6	orange	oil	1 pt
9	blue	latex	1 gal
12	magenta	shellac	1 ounce
15	white	acrylic	1 qt

color: sandy brown  
type: acrylic  
amount: 1 gal

# Sampling

- Sample random row
- Sample random page





# Summary

- **Recursion**
  - walk through hierarchy with query
- **Pivot**
  - turn rows into columns
  - entity-attribute-value
- **Sampling**
  - subset of table
  - correlation may be an issue