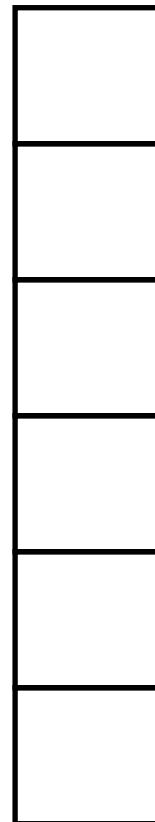


# CS143: Files

# Main Problem

- How to store tables into disks?

Jane	CS	3.7
Susan	ME	1.8
June	EE	2.6
Tony	CS	3.1



# Answer

- No single “right” answer
  - Depends on schema, tuple size, block size, access pattern, etc.
  - Still a research area
- We go over the basic issues and typical solution in the class

# Spanned vs Unspanned

- Unspanned

T1		
T2		
T3		

T4		
T5		
T6		

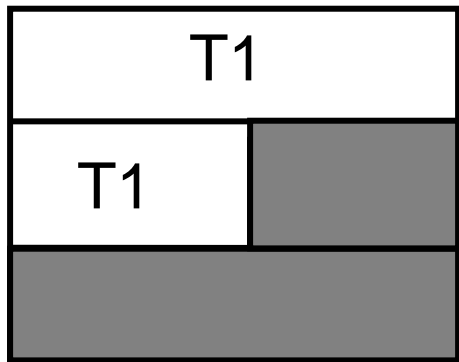
- Spanned

T1		
T2		
T3	T4	

T4	T5	
	T6	
T7	T8	

# Space Waste for Unspanned Tuples

- Worst case



- 512B block
- $T1 = 257B$
- Empty space = 255B
- Up to 50% waste

# Deletion

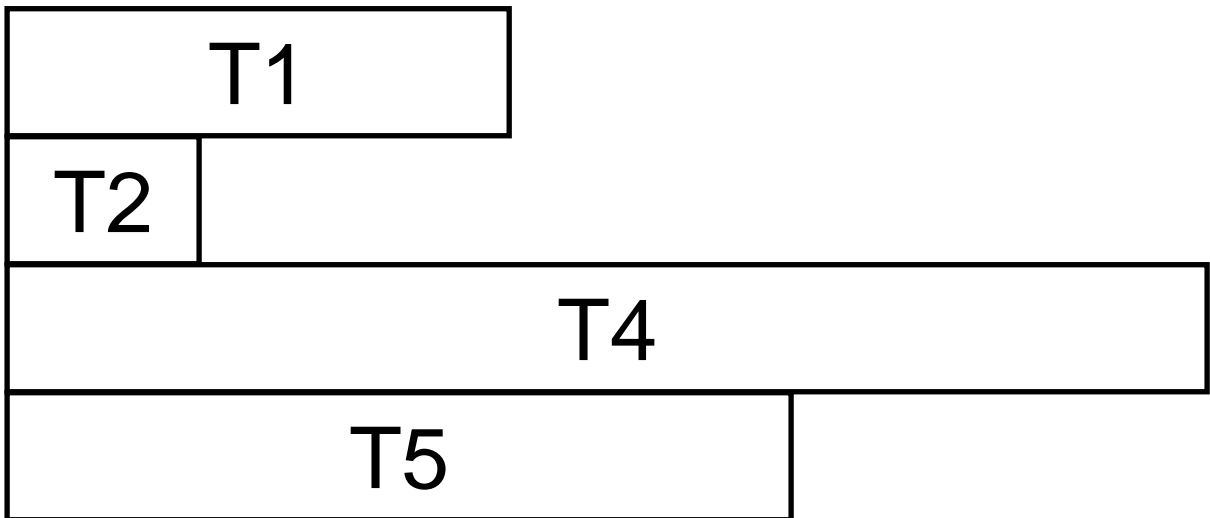
- For now, ignore spanning issue
  - Irrelevant for current discussion

Susan	CS	3.7
<del>Elaine</del>	<del>ME</del>	<del>2.8</del>
James	EE	1.8
Peter	EE	3.9
John	CS	1.0
Tony	EE	2.4

- What should we do?

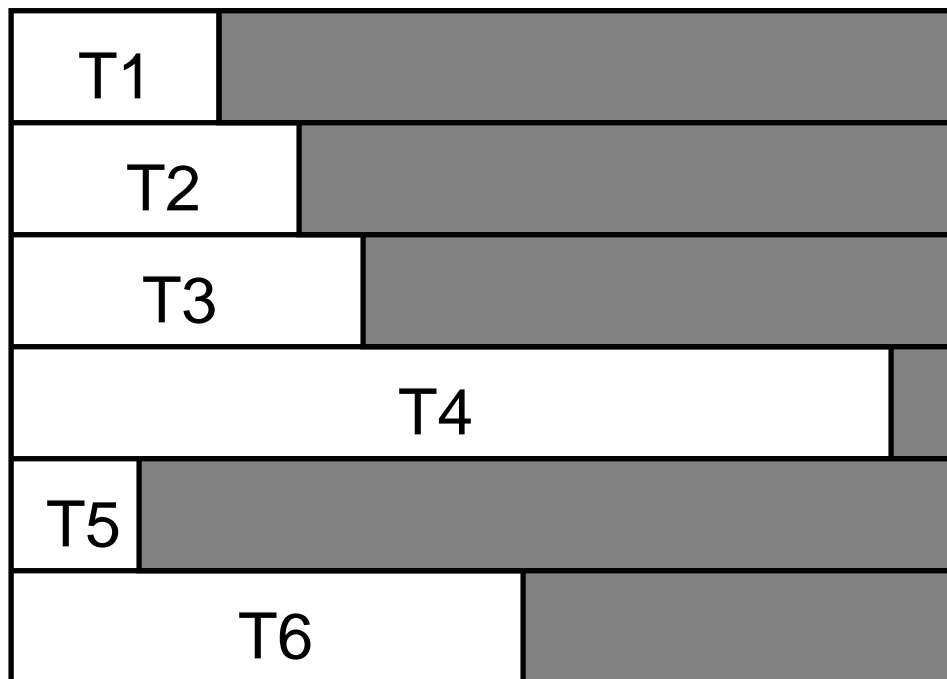
# Variable-Length Tuples

- What should we do?



# Reserved Space

- Reserve the maximum space for each tuple

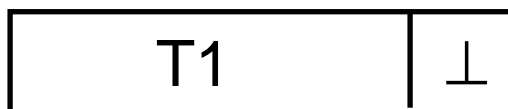


# Variable Length

- Tuple length in the beginning



- End-of-record symbol



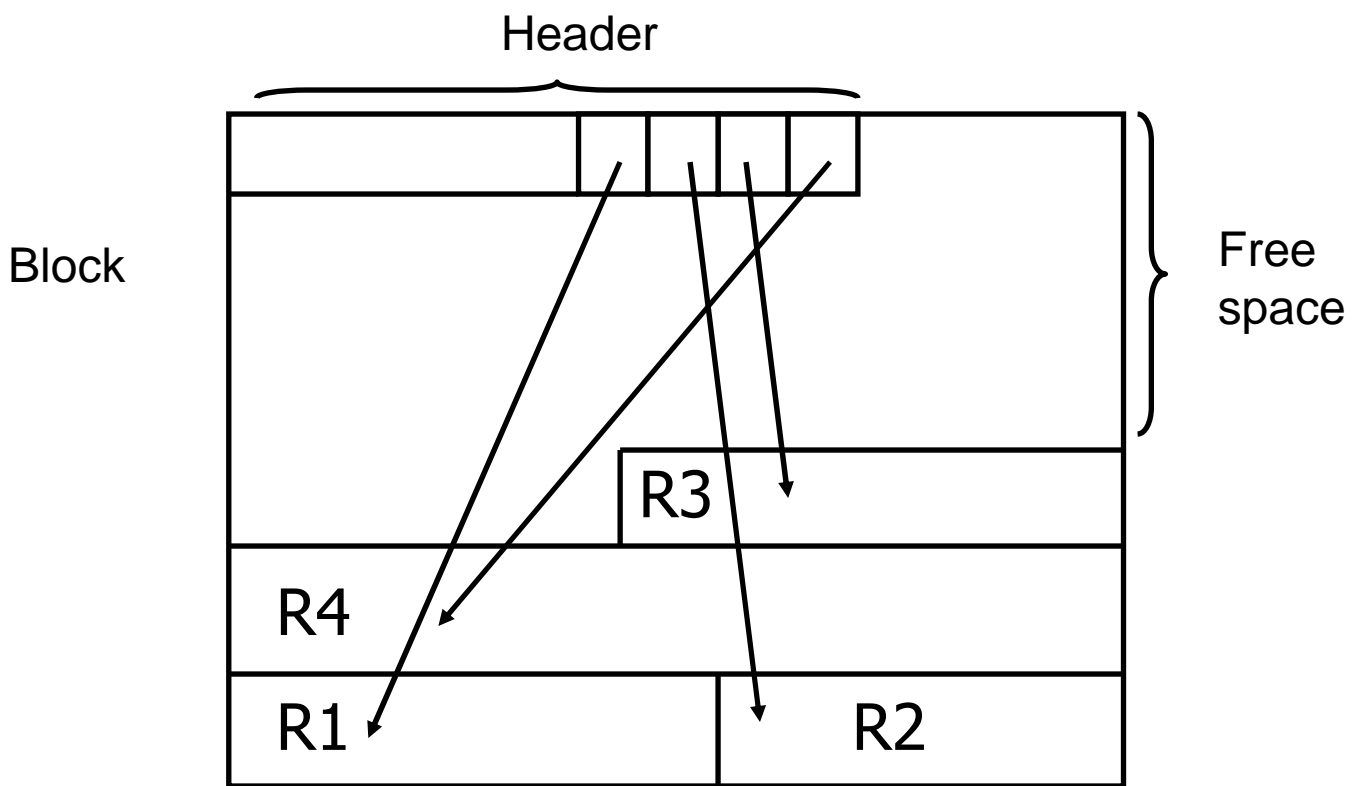
- Pack the tuples tightly into a page

# Update on Variable Length Tuples?

R1		R2
R3		
R4		R5
	R6	

R7	R8	
R9	R10	

# Slotted Page



# Long Tuples

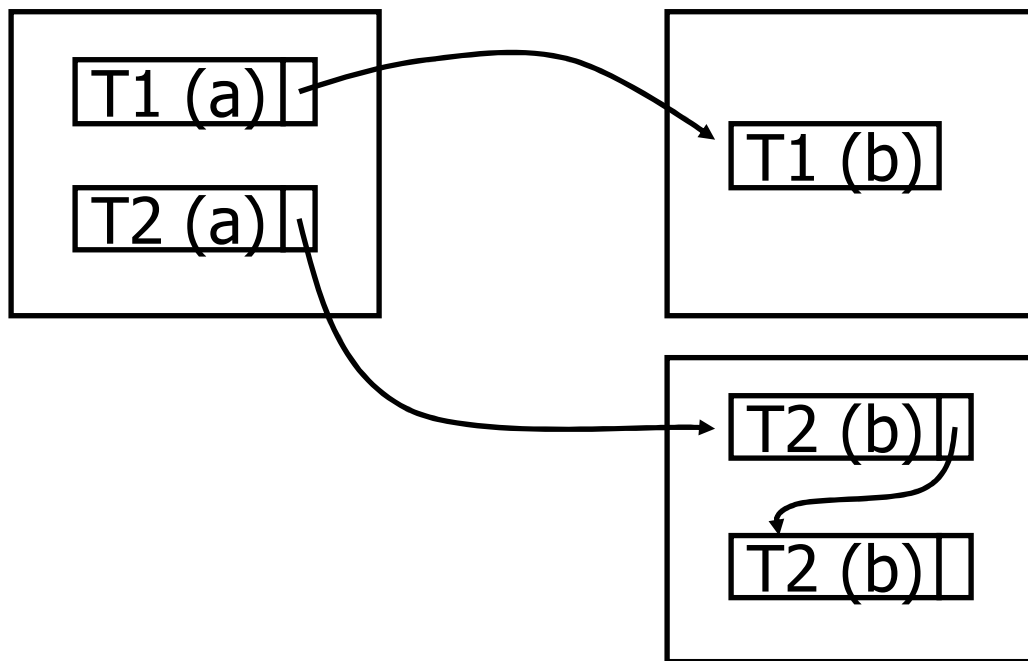
- ProductReview(  
pid INT,  
reviewer VARCHAR(50),  
date DATE,  
rating INT,  
comments VARCHAR(1000))
- Block size 512B
- How should we store it?

# Long Tuples

- Spanning
- Splitting tuples

Block with short attributes.

Block with long attrs.



This block may also have fixed-length slots.

# Sequential File

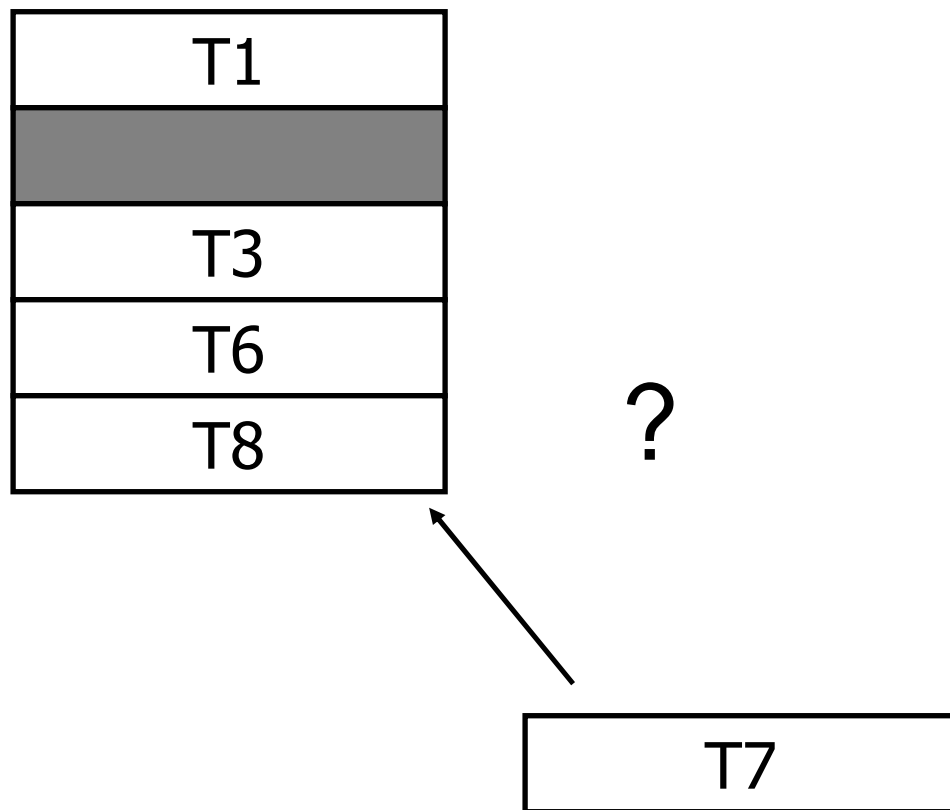
- Tuples are ordered by some attributes (search key)

Elaine	CS	3.7
James	ME	2.8
John	EE	1.8
Peter	EE	3.9
Susan	CS	1.0
Tony	EE	2.4

– Search key: Name attribute

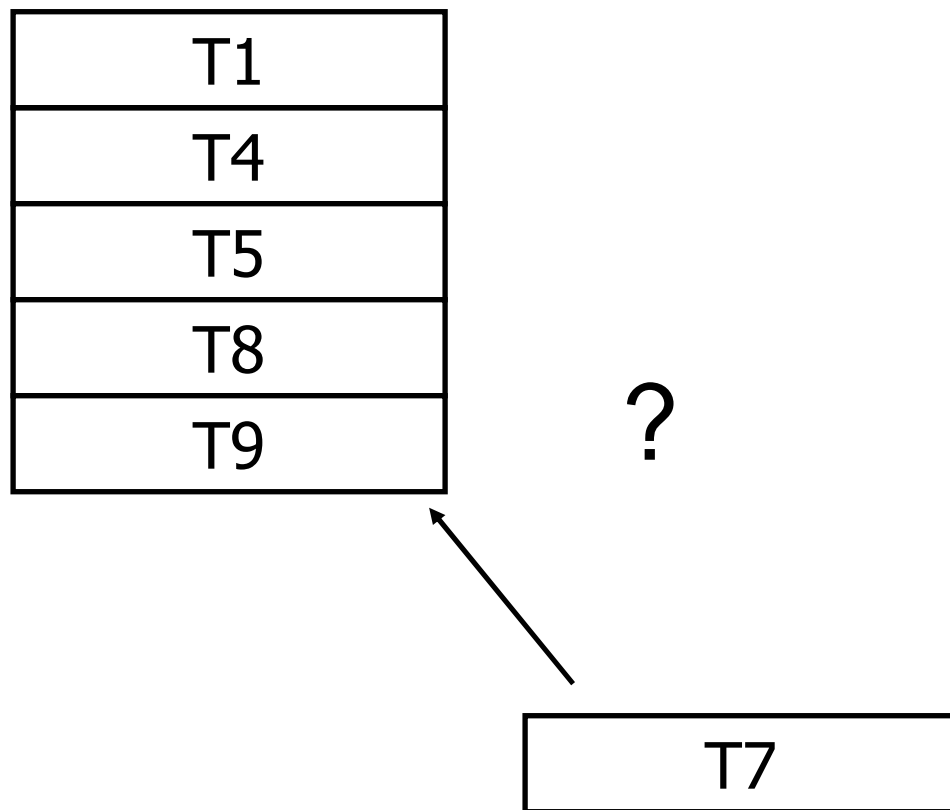
# Sequencing Tuples

- Inserting a new tuple
  - Easy case



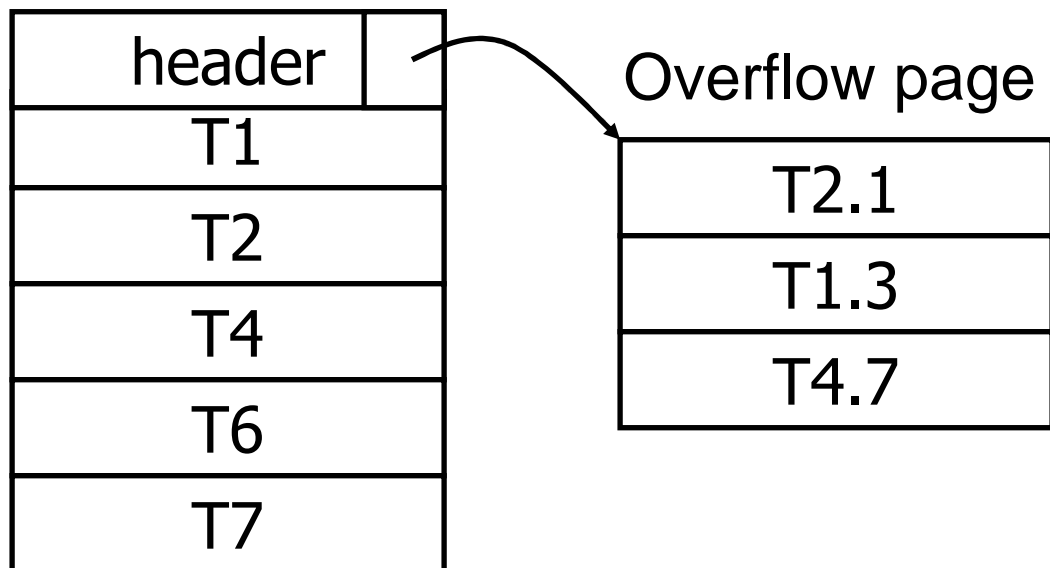
# Sequencing Tuples

- Inserting a new tuple
  - Difficult case



# Sequencing Tuples

- Overflow page



- Any problem?
  - PCTFREE in DBMS

# Things to Remember

- How to store tables into a disk
- disk page (block)
- spanned/unspanned tuples
- variable-length tuples
  - slotted page structure
- long tuples
- sequential file and search key
  - problems with insertion
  - overflow page
  - PCTFREE