

$$\lambda = \frac{n}{ts}$$

S_n = expected number of probes
(for successful) (looks) in a table with
search n data items

U_n = expected number probes
(unsuccessful) in a table with n
search data items

$n < 1$	linear	$\frac{U_n}{2} \left(1 + \frac{1}{(1-\lambda)^2} \right)$	$\frac{S_n}{2} \left(1 + \frac{1}{1-\lambda} \right)$
	quadratic random	$\frac{1}{1-\lambda}$	$\frac{1}{\lambda} \log_e(1-\lambda)$
$n > 0$	chained	λ	$1 + \frac{\lambda}{2}$

$$\lambda = \frac{5}{10}$$

$$U_5 = \frac{1}{1 - 0.5} = 2$$

... .. ited value

Compute expected value
(average)

$$\lambda = \frac{n}{ts}$$

1	$\frac{1}{n}$
2	$\frac{1}{n}$
3	$\frac{1}{n}$
\vdots	
n	$\frac{1}{n}$

#probes

probability

1	$1 - \lambda$
2	$(1 - \lambda) \cdot \lambda$
3	$(1 - \lambda) \lambda^2$
\vdots	
k	$(1 - \lambda) \lambda^{k-1}$

$$1 \cdot \frac{1}{n} + 2 \cdot \frac{1}{n} \dots n \cdot \frac{1}{n}$$

$$\frac{1}{n} \sum_{i=1}^n i = \frac{1}{n} \frac{n(n+1)}{2}$$

$$U_n = \sum_{i=1}^{\infty} i(1-\lambda) \lambda^{i-1}$$

Aside

$$(1-\lambda) \sum_{i=1}^{\infty} i \lambda^{i-1}$$

$$\sum_{i=1}^k x^k = \frac{x^{k+1} - 1}{x - 1}$$

$$1 + x + x^2 + \dots + x^k = \frac{x^{k+1} - 1}{x - 1}$$

$$d \sum_{i=1}^k x^i = d \left(\frac{x^{k+1} - 1}{x - 1} \right) / dx$$

$$\sum_{i=0}^k i \cdot x^{i-1} = \frac{1}{(1-x)^2}$$

Ⓚ present

z, y →

x	
Ⓚ e	
z	

linear probe

Ⓚ - empty never used

Ⓚ - empty but used

hash function

- ① distribution piece
- ② compression piece

File 1
File 2
File 3

string 80

File Project 3 Example.cpp

File Project > 2 examples

$$\text{sum} = \sum \overset{w_0}{\text{ASC}(F)} + \overset{w_1}{\text{ASC}(i)} + \dots$$

$$h(\text{key}) = \text{sum}(\text{key}) \% ts$$

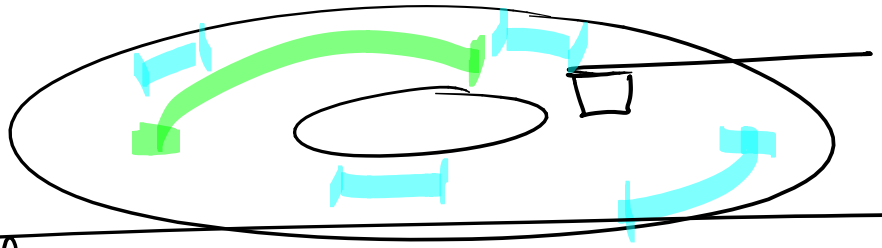
$$\text{sum digits} \quad \sum_{i=1}^n d_i$$

$$\text{polynomial digits} \quad \sum_{i=1}^n a_i \cdot d_i$$

$$\downarrow$$
$$\sum_{i=1}^n i \cdot d_i$$

mid square

$$\text{key}^2$$
$$\downarrow$$
$$(\text{key} / ts) \% ts$$

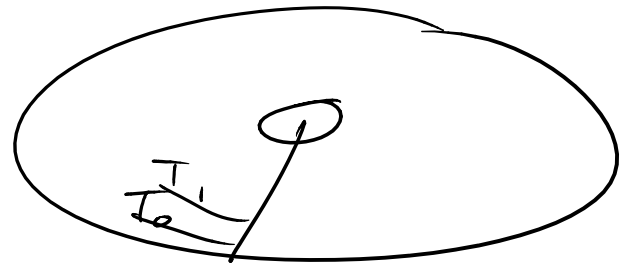


Number of Reads
Number of Writes
Head motion

Space allocation
is contiguous

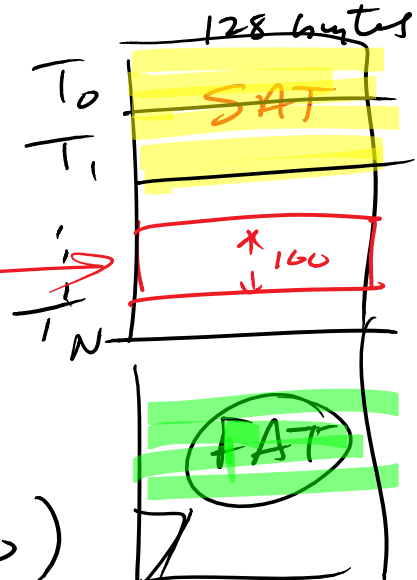
Flat file system
(no hierarchy)

$\circ = \text{Allocate}(\text{addr}, \text{len})$



SAT - space allocation
table

$\circ = \text{Release}(500, 100)$



create / "file.0001" 500 100)

create ("File 0001" 500 100)