CSE 208: Data Structures and Algorithms II

Topic: Hashing

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Hash Functions

Hash Function 1:

```
long long hash1(string const &s)
{
	int p = 31;
	long long hash_val = 0;
	int p_pow = 1;

	for (int i = 0; i < 7; i++)
	{
		hash_val = (hash_val + (s[i] - 'a') * p_pow)%TABLE_SIZE;
		p_pow = (p_pow * p)% TABLE_SIZE;
	}
	return hash_val;
}
```

Hash Function 2:

```
long long hash2(string const &s)
{
	int p = 37;
	long long hash_val = 0;
	int p_pow = 1;
```

```
    for (int i = 0; i < 7; i++)
    {
        hash_val = (hash_val + (s[i] - 'a') * p_pow)% TABLE_SIZE;
        p_pow = (p_pow * p)% TABLE_SIZE;
    }
    return hash_val;
}
```

Auxillary Hash Function:

```
long long auxHash(string const& s)
{
    int p = 7;
    long long hash_val = 0;
    int p_pow = 1;
    for (int i = 0; i < 7; i++)
    {
        hash_val = (hash_val + (s[i] - 'a') * p_pow)% TABLE_SIZE;
        p_pow = (p_pow * p)% TABLE_SIZE;
    }
    return hash_val;
}
```

Report:

For TABLE_SIZE = 10007

	Hash 1		Hash 2	
	Number of Collisions	Average Probes	Number of Collisions	Average Probes
Chaining Method	3684	1.472	3740	1.498
Double Hashing	67654	6.712	71170	8.414
Custom Probing	61352	5.764	62273	6.305

For TABLE_SIZE = 20011

	Hash 1		Hash 2	
	Number of Collisions	Average Probes	Number of Collisions	Average Probes
Chaining Method	2106	1.222	2132	1.236
Double Hashing	3889	1.351	3872	1.327
Custom Probing	3793	1.337	3926	1.389

For TABLE_SIZE = 100003

	Hash 1		Hash 2	
	Number of Collisions	Average Probes	Number of Collisions	Average Probes
Chaining Method	459	1.049	497	1.034
Double Hashing	522	1.056	559	1.039
Custom Probing	514	1.051	557	1.038