Lab One Report

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1 Introduction

For a Telecommunication engineer, working on embedded systems Knowledge of Fixed point and Floating point no. are crucial in their domain. Most of the language used in development like C,C++ etc. uses floating point representation as their default value.

2 Code In C

2.1 headers

header files used for implementation are:

```
1 #include<stdio.h>
2 #include<sys/time.h>
3 #include<stdlib.h>
4 #include"../include/header.h"
```

Figure 1: Headers used in C code

2.2 Fixed point Implementation

Fixed point Implementation are done through use of functions like FixedToDouble,DoubleToFixed,Mul.In language C, bit manipulation can be used to convert from Floating point to Fixed point.

2.2.1 Fixed to Double

Fixed to Double implementation is shown below(Figure 2):

2.2.2 Double to Fixed

Double to Fixed implementation is shown below(Figure 3):

```
114 double FixedToDouble(int x){
115         return ((double)x/(double)(1<<scale));
116 }
```

Figure 2: Fixed to Double C function

```
110 int DoubleToFixed(double x){
111         return (x*(double)(1<<scale));
112 }
```

Figure 3: Double to Fixed C function

2.2.3 Multiplication

Multiplication implementation is shown below(Figure 4):

```
118 int Mul(int x, int y){
119         return((x>>8)*(y>>8));
120 }
```

Figure 4: Fixed point multiplication code in C

2.3 Random numbers generator

Random Numbers generator function code in C is shown below(Figure 5):

2.4 Results

Fixed point Implementation of matrix multiplication takes more time than Floating point Implementation as shown in the figure 8.

```
for(i=0;i<r;i++){
        for(j=0;j<r;j++){
                A[i][j] = ((double)rand()/RAND_MAX)*5.0;
                B[i][j] = ((double)rand()/RAND_MAX)*5.0;
        }
}
```

Figure 5: Random no. generator code in C

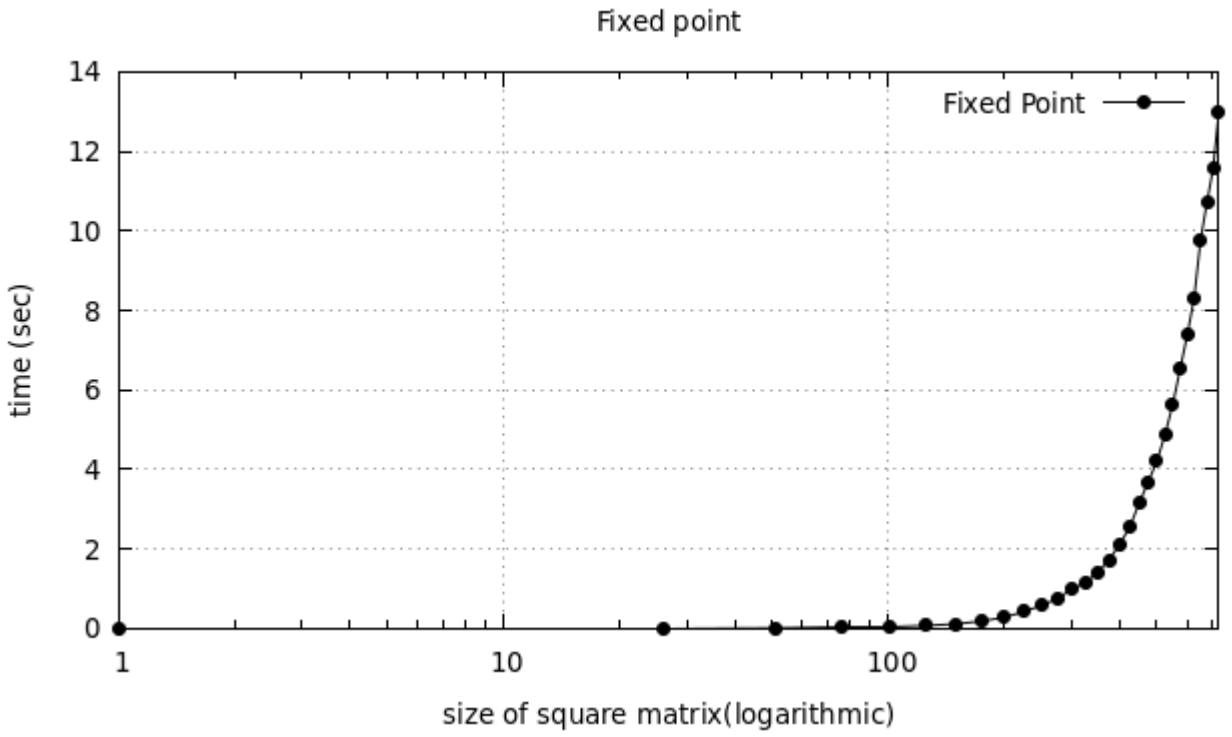

Figure 6: Fixed point

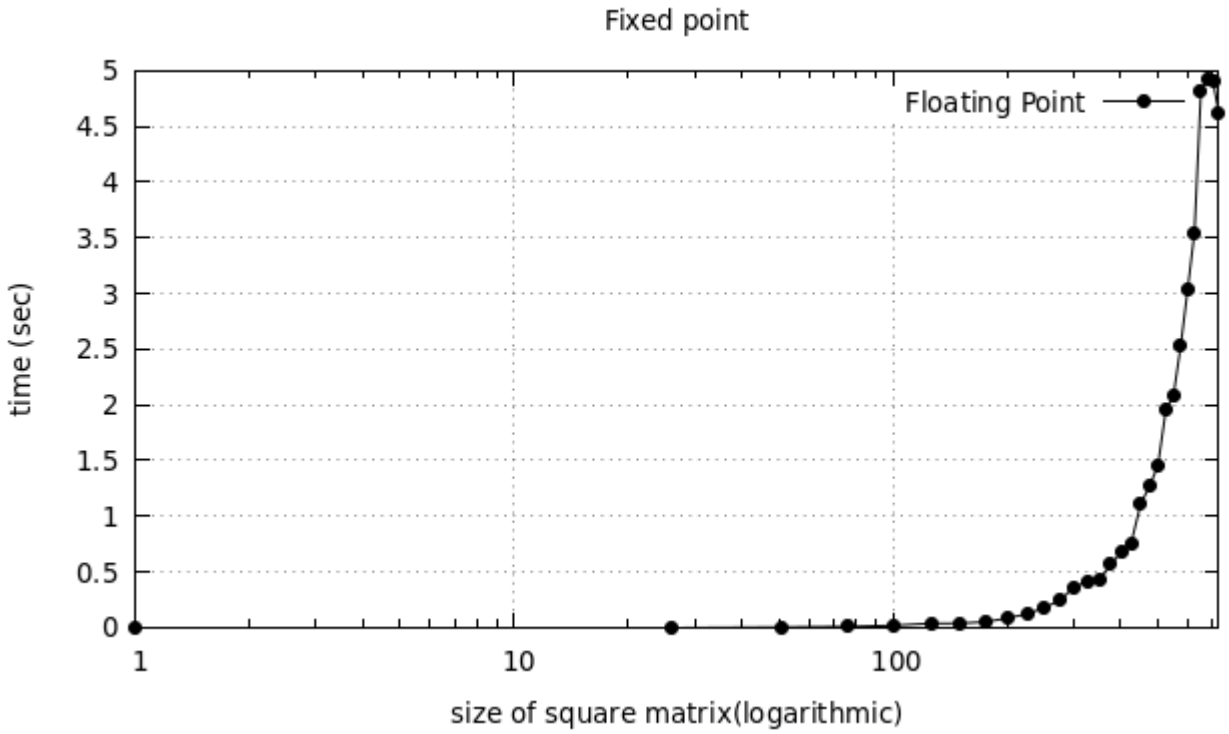

Figure 7: Floating Point

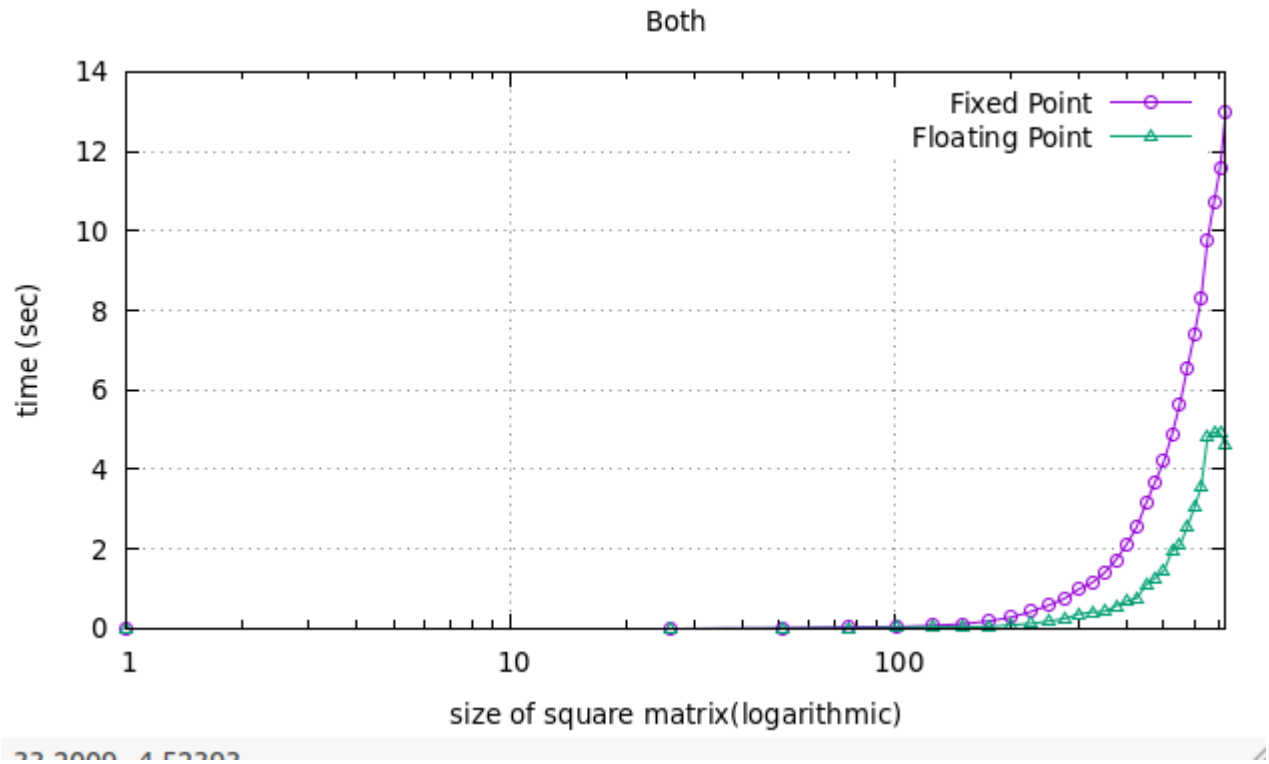

Figure 8: Fixed and Floating Point