In [1]:
```
print('My name is Zhicheng (Jason) Xue')
```

```
My name is Zhicheng (Jason) Xue
```

In [2]:
```
import tensorflow as tf
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import random
random.seed(2018)
```

1. Placeholder for an input array with dtype float32 and shape None

2. Scopes for the input, middle section and final node f

In [3]:
```
graph = tf.Graph()
```

In [4]:
```
with graph.as_default():

    #Scope for the input section
    with tf.name_scope(name='Input_placeholder'):
        #1.  Placeholder for an input array with dtype float32 and shape None
        a = tf.placeholder(shape=None, dtype=tf.float32, name='input_a')

    #Scope for the middle section
    with tf.name_scope(name='Middle_section'):

        b = tf.reduce_prod(input_tensor=a, name='product_b')
        c = tf.reduce_mean(input_tensor=a, name='mean_c')
        d = tf.reduce_sum(input_tensor=a, name='sum_d')
        e = tf.add(b,c, name='add_e')

    #Scope for the final node
    with tf.name_scope(name='Final_node'):

        f = tf.multiply(x=e,y=d,name='mul_f')
```

3. Feed the placeholder with an array A consisting of 100 normally distributed random numbers with Mean = 1 and Standard devia=on = 2

In [5]:
```
input_array=np.random.normal(1,2,100)
```

In [6]:
```
print(input_array)
```

```
[ 2.64081826e+00  2.09959774e+00  1.78568866e+00  1.81446886e-01
  1.25909470e+00  2.20953826e+00  2.84538954e+00  2.92445779e-01
 -1.50297314e+00  2.52719099e-01 -1.87094977e+00  1.50930579e+00
  1.67477569e+00  1.22236573e+00 -6.35357426e-01  6.01078809e-01
  1.04401462e+00  5.71105166e+00 -1.13340353e+00  2.30732658e+00
  1.67206217e+00 -1.19361089e+00 -3.33492888e+00  1.07023214e+00
  1.02199008e+00  4.24736462e-01  3.23041263e-01  2.69442785e+00
  1.06395863e+00  5.38191388e-01  1.65455862e+00  8.76624910e-01
 -1.91954395e+00 -8.17410371e-01  2.83540997e+00  2.57889639e+00
  4.91787119e-01  1.99209500e+00 -2.73035781e+00  2.20100457e-02
  9.42828522e-01 -2.68007054e-01 -2.72554956e-01  3.79550257e+00
 -3.71689966e-01 -1.08120148e+00 -4.76418573e-01  1.32657946e+00
  3.12127799e+00 -1.93537743e+00  6.91145003e-01  9.34454082e-01
  2.42768051e+00  6.38498516e-01  2.24945368e+00 -7.21070224e-01
 -1.07748561e+00  6.67292521e+00  4.88211595e+00 -4.73575787e-01
  6.38561136e-03 -9.83788914e-01  5.94008830e-01  5.65961263e-01
  3.20664697e-01  2.06488493e-01 -1.49825475e-01  1.66930468e+00
  7.49339728e-02  1.17331215e+00  2.52968115e+00 -9.68058325e-01
  4.14085320e+00  1.49748745e+00  4.20762582e+00  9.65172688e-01
  2.12061140e+00 -1.22348632e+00 -2.19189949e+00  3.78619353e-02
 -1.39538348e+00  7.06453592e-01  4.55663843e+00  1.66872558e+00
  6.43488464e-01 -3.89631670e-01  9.61617331e-01  1.41337793e+00
  1.07363243e+00 -2.11845787e+00  1.75285031e+00  5.56819130e-01
  3.99060424e+00  1.16144122e-01  3.69514911e+00  5.45340317e-01
  4.48589501e+00  2.44918209e+00 -7.06304931e-01 -1.17682097e+00]
```

In [7]:
```
replace_dict={a:input_array}
```

In [8]:
```
sess=tf.Session(graph=graph)
```

In [9]:
```
sess.run(a,feed_dict=replace_dict)
```

Out[9]:
```
array([ 2.6408184e+00,  2.0995977e+00,  1.7856886e+00,  1.8144688e-01,
        1.2590947e+00,  2.2095382e+00,  2.8453896e+00,  2.9244578e-01,
       -1.5029731e+00,  2.5271910e-01, -1.8709497e+00,  1.5093058e+00,
        1.6747757e+00,  1.2223657e+00, -6.3535744e-01,  6.0107881e-01,
        1.0440146e+00,  5.7110515e+00, -1.1334035e+00,  2.3073266e+00,
        1.6720622e+00, -1.1936109e+00, -3.3349290e+00,  1.0702322e+00,
        1.0219901e+00,  4.2473647e-01,  3.2304126e-01,  2.6944280e+00,
        1.0639586e+00,  5.3819138e-01,  1.6545587e+00,  8.7662488e-01,
       -1.9195440e+00, -8.1741035e-01,  2.8354099e+00,  2.5788963e+00,
        4.9178711e-01,  1.9920950e+00, -2.7303579e+00,  2.2010045e-02,
        9.4282854e-01, -2.6800704e-01, -2.7255496e-01,  3.7955027e+00,
       -3.7168998e-01, -1.0812014e+00, -4.7641858e-01,  1.3265795e+00,
        3.1212780e+00, -1.9353775e+00,  6.9114500e-01,  9.3445408e-01,
        2.4276805e+00,  6.3849854e-01,  2.2494538e+00, -7.2107023e-01,
       -1.0774856e+00,  6.6729250e+00,  4.8821158e+00, -4.7357580e-01,
        6.3856114e-03, -9.8378891e-01,  5.9400880e-01,  5.6596124e-01,
        3.2066470e-01,  2.0648849e-01, -1.4982547e-01,  1.6693047e+00,
        7.4933976e-02,  1.1733122e+00,  2.5296812e+00, -9.6805835e-01,
        4.1408534e+00,  1.4974874e+00,  4.2076259e+00,  9.6517271e-01,
        2.1206114e+00, -1.2234863e+00, -2.1918995e+00,  3.7861936e-02,
       -1.3953835e+00,  7.0645362e-01,  4.5566382e+00,  1.6687256e+00,
        6.4348847e-01, -3.8963166e-01,  9.6161735e-01,  1.4133779e+00,
        1.0736325e+00, -2.1184578e+00,  1.7528503e+00,  5.5681914e-01,
        3.9906042e+00,  1.1614412e-01,  3.6951492e+00,  5.4534030e-01,
        4.4858952e+00,  2.4491820e+00, -7.0630491e-01, -1.1768210e+00],
      dtype=float32)
```

In [10]:
```
sess.run(b,feed_dict=replace_dict)
```

Out[10]: 1.7552426

In [11]:
```
sess.run(c,feed_dict=replace_dict)
```

Out[11]: 0.90185827

In [12]:
```
sess.run(d,feed_dict=replace_dict)
```

Out[12]: 90.18583

In [13]:
```
sess.run(e,feed_dict=replace_dict)
```

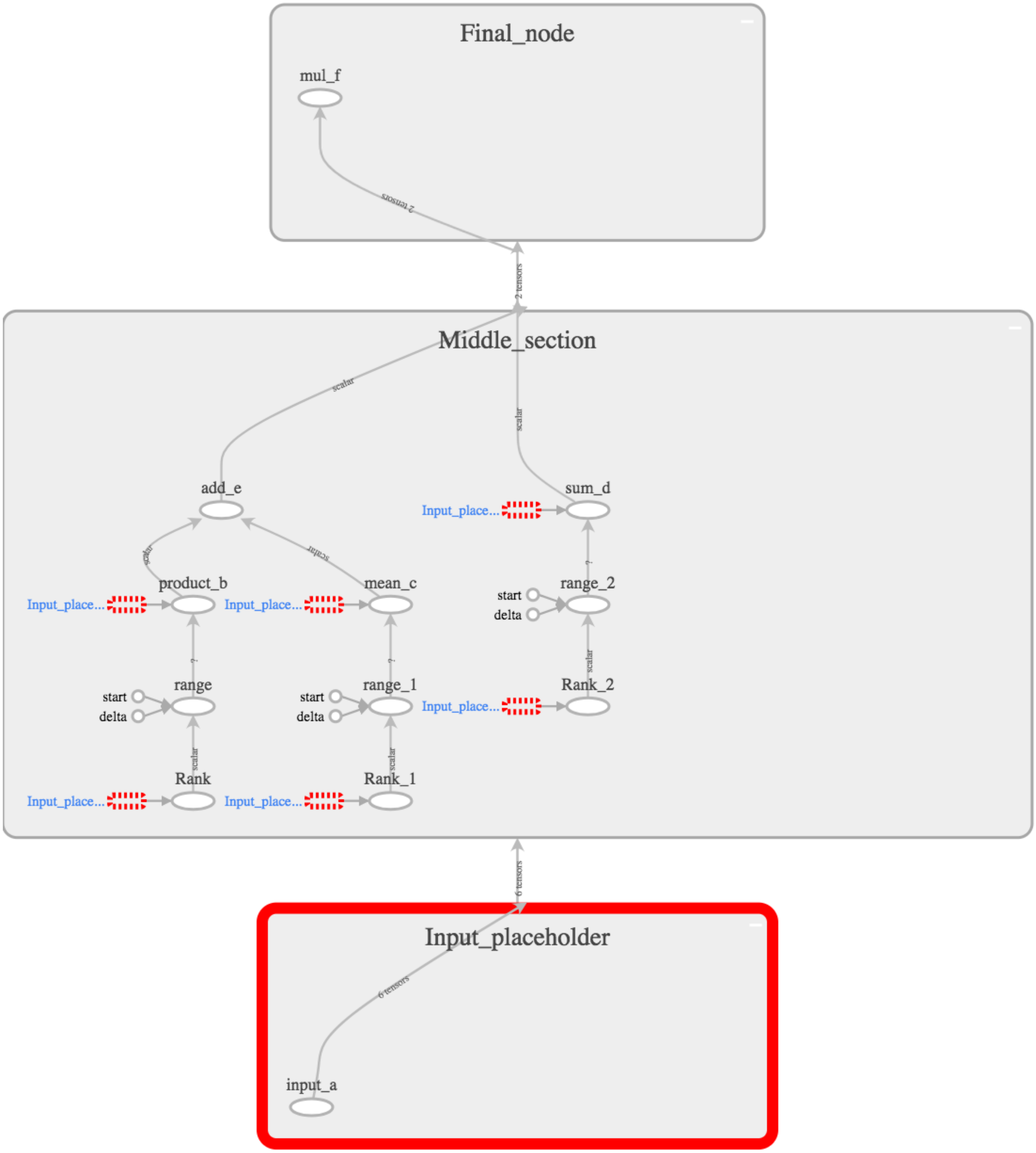
Out[13]: 2.657101

In [14]:
```
sess.run(f,feed_dict=replace_dict)
```

Out[14]: 239.63284

4. Save your graph and show it in TensorBoard

In [16]:
```
writer=tf.summary.FileWriter('./hw2',graph=graph)
```


Final_node
mul_f
2 tensors
2 tensors
Middle_section
scalar
scalar
add_e
sum_d
Input_place...
scalar
scalar
product_b
mean_c
range_2
Input_place...
Input_place...
start
delta
?
?
?
range
range_1
Rank_2
start
delta
start
delta
Input_place...
scalar
scalar
scalar
Rank
Rank_1
Input_place...
Input_place...
6 tensors
Input_placeholder
6 tensors
input_a

In [17]:
```
writer.close()
```

In [18]:
```
sess.close()
```

5. Plot you input array on a separate figure

In [19]:
```
# histogram of the input array
n, bins, patches = plt.hist(input_array, 5, density=1, facecolor='g', alpha=0.75)


plt.xlabel('Random Normal Number')
plt.ylabel('Probability')
plt.title('Histogram of Random Generated Array From Normal(1,2)',)
plt.text(3, .2, r'$\mu=1,\ \sigma=2$')
plt.axis([-5, 7, 0, 0.25])
plt.grid(True)
plt.show()
```