CS5250 Advanced Operating Systems

Pop Quiz 6

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Suppose there are three tasks, A, B, and C, of niceness levels -2, 0, 2, respectively. Assume that they arrived at the same time. Show the first 10 context switches that will happen under CFS and BFS. Please show your working, i.e., the intermediate state of the corresponding data structures. State any assumption clearly.

1. CFS:
    1. Starting vruntime = 0 for all.
    2. Load Weight:
        1. -2 = 1586
        2. 0 = 1024
        3. 2 = 655
        4. total = 3265
    3. Time share:
        1. -2 = 2914.54
        2. 0 = 1881.77
        3. 2 = 1203.67
    4. Sequence:
        1. -2, update vruntime += 1881.77
        2. 0, update vruntime += 1881.77
        3. 2, update vruntime += 1881.77
        4. -2
        5. 0
        6. 2
        7. -2
        8. 0
        9. 2
        10. -2
    5. At 4th, 7th, 10th step, the vruntime of all tasks will have the same value and will repeat the sequence.
2. BFS:
    1. Prioratio:
        1. -2 = 715
        2. 0 = 866
        3. 2 = 1048
    2. Scaling factor = s = 8192
    3. Niffies = t0, now for all

4. rr_interval = r = 6
5. Virtual Deadline
    1. -2 = t0 + 715 * s * r = 0 + 715 * 8192 * 6 = 35143680
    2. 0 = t0 + 866 * s * r = 0 + 866 * 8192 * 6 = 42565632
    3. 2 = t0 + 1048 * s * r = 0 + 1048 * 8192 * 6 = 51511296
6. Sequence:
    1. -2, update virtual deadline = 6000000 + 715 * s * r = 41143680
    2. -2, update virtual deadline = 12000000 + 35143680 = 47143680
    3. 0, vd = 18000000 + 42565632 = 60565632
    4. -2, vd = 24000000 + 35143680 = 59143680
    5. 2, vd = 30000000 + 51511296 = 81511296
    6. -2, vd = 36000000 + 35143680 = 71143680
    7. 0, vd = 42000000 + 42565632 = 84565632
    8. -2, vd = 48000000 + 35143680 = 83143680
    9. 2, vd = 54000000 + 51511296 = 105511296
    10. -2, vd = 60000000 + 35143680 = 95143680