Integer Vector Optimizations and "Usual Arithmetic Conversions"

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Usual Arithmetic Conversions (UACs)

```c
char a, b, c;
// ...
c = a + b;
// ...
```

```asm
%0 = load i8, i8* @a, align 1
%conv0 = sext i8 %0 to i32
%1 = load i8, i8* @b, align 1
%conv1 = sext i8 %1 to i32
%add = add nsw i32 %conv0, %conv1
%conv2 = trunc i32 %add to i8
store i8 %conv2, i8* @c, align 1
```
UAC Optimization

%0 = load i8, i8* @a, align 1
%conv0 = sext i8 %0 to i32
%1 = load i8, i8* @b, align 1
%conv1 = sext i8 %1 to i32
%add = add nsw i32 %conv0, %conv1
%conv2 = trunc i32 %add to i8
store i8 %conv2, i8* @c, align 1
Performance Impact

• 2 tests are more than 2X slower
• 7 are more than 10% slower
• 35 are more than 5% slower
• 52 are more than 5% faster
• 82 are more than 10% faster
• 22 are more than 2X faster
• 17 are more than 5X faster
• 2 are more than 10X faster
• 1 is more than 20X faster
• 2 are more than 30X faster