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Why ZenCart Sales Tax is Error by a Penny

If you have encounter the problem where the ZenCart computed sales tax is off by a penny, it is because there is a round-off error bug in the ZenCart version 1.3.8 (and possibly before).

ZenCart computed sales tax is correct in most cases. However, in certain cases involving orders with multiple products, there is a rounding error in the computed sales tax. And the customer ends up paying one penny too much or too little. The bug is more likely to occur when the tax percentage is two decimal places to the right of the decimal point and then only occurs in certain combination of product prices.

One such combination of prices and tax that can reproduce this bug is the following...

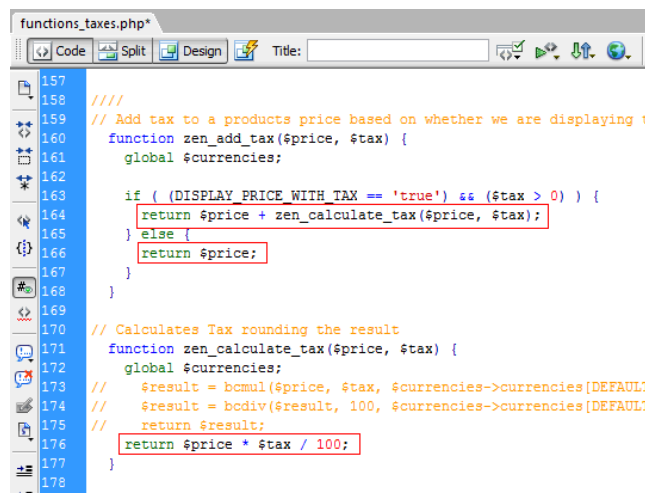
1. Create a "taxable goods" product "Foobar" with price \$3.95.
2. Create "taxable goods" product "Widget" with price \$8.95.
3. Set California sales tax to 8.25%.
4. Have California customer purchase a Foobar and a Widget with product total of \$12.90.
5. See that ZenCart is charging incorrect tax of \$1.07
6. Expected result: The correct tax to be charged the customer is \$1.06 obtained by $(12.90 * 0.0825)$.

The reason why the ZenCart result is incorrect is because ZenCart is computing sales tax for each product, rounding, and then totalling. This is wrong. As learned in school, one should never round intermediary calculations. One should round at the end just for display purposes.

The correct order of operation is to total all the product prices, then compute sales tax on that total, and then round for display. This is also mentioned in "[Texas Sales Tax FAQ](#)" where in point number 2, it states "If you sell multiple taxable items on one invoice, then you must compute the tax on the total sum of the sales prices of the taxable items sold."

The way to fix this error is to alter core ZenCart code:

1. In file **includes/functions/functions_taxes.php**, remove the call to **zen_round()** from **zen_add_tax()** and **zen_calculate_tax()** functions so that it now looks like ...

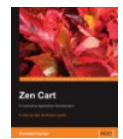


```

157 // Add tax to a products price based on whether we are displaying t
158 function zen_add_tax($price, $tax) {
159     global $currencies;
160     if ( (DISPLAY_PRICE_WITH_TAX == 'true') && ($tax > 0) ) {
161         return $price + zen_calculate_tax($price, $tax);
162     } else {
163         return $price;
164     }
165 }
166 // Calculates Tax rounding the result
167 function zen_calculate_tax($price, $tax) {
168     global $currencies;
169     $result = bcmul($price, $tax, $currencies->currencies[DEFAULT];
170     $result = bcdiv($result, 100, $currencies->currencies[DEFAULT];
171     return $result;
172     return $price * $tax / 100;
173 }
174 }

```

2. In file **includes/classes/order.php** near the line number shown, remove the call to **zen_round()** so that it looks like ...



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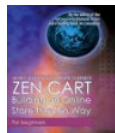
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```

order.php*
Code Split Design Title:
500 'tax']) * $this->products[$index]['qty'])
501 + zen_add_tax($this->products[$index]['onetime_charges'], $this->products[$index]['tax']);
502 $this->info['subtotal'] += $shown_price;
503
504 // find product's tax rate and description
505 $products_tax = $this->products[$index]['tax'];
506 $products_tax_description = $this->products[$index]['tax_description'];
507
508 if (DISPLAY_PRICE_WITH_TAX == 'true') {
509     // calculate the amount of tax "inc"luded in price (used if tax-in pricing is enabled)
510     $tax_add = $shown_price - ($shown_price / (($products_tax < 10) ? "1.0" : str_replace('.', ''
511 , $products_tax) : "1." . str_replace('.', '', $products_tax)));
512 } else {
513     // calculate the amount of tax for this product (assuming tax is NOT included in the price)
514     $tax_add = ($products_tax / 100) * $shown_price;
515 }
516 $this->info['tax'] += $tax_add;
517 if (isset($this->info['tax_groups'][$products_tax_description])) {
518     $this->info['tax_groups'][$products_tax_description] += $tax_add;
519 } else {
520     $this->info['tax_groups'][$products_tax_description] = $tax_add;
521 }
522 /*****
523 * END: Calculate taxes for this product
524 *****/
525 $index++;
526 }
527
528 // Update the final total to include tax if not already tax-inc
529 if (DISPLAY_PRICE_WITH_TAX == 'true') {

```

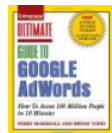
Note that these changes is applicable to version 1.3.8 of ZenCart.



[Zen Cart](#)
Kerry Watson; Matt...



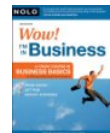
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